

SOUTHERN POWER AND INDUSTRY

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JANUARY, 1951

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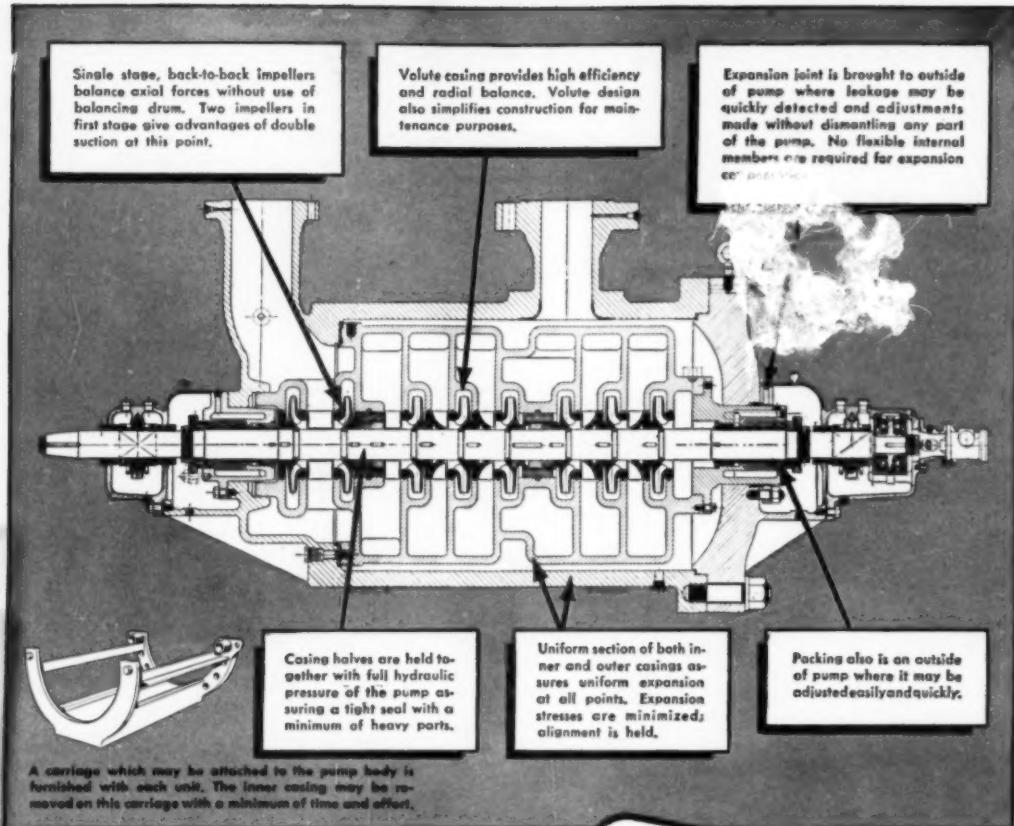
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HERE IS A PUMP designed to meet the needs of the newer high pressure boiler plants. Efficiency is high, maintenance is low and every design feature has a long record of successful application to boiler feed service.

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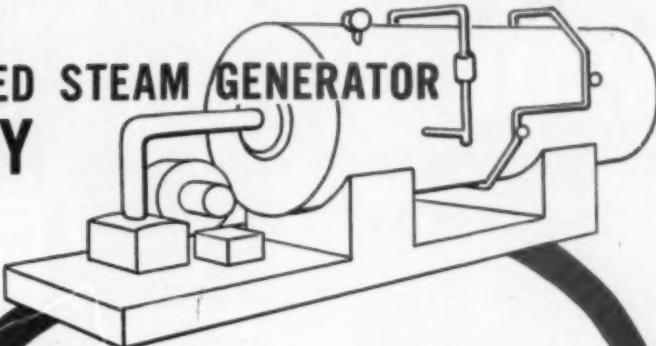
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Volume 69

Number 1

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Write for Bulletin 46

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A RECORD of LOW MAINTENANCE COSTS



Elkhorn, Wisconsin, Municipal Power Plant. This Nordberg Dualfuel engine is a four-cycle, six-cylinder, supercharged unit driving an 875 kw Elliott generator. Natural gas is burned except during extreme cold weather when the engine goes on oil fuel. Use of Texaco Urso Oil for lubrication has played an important part in reducing power costs by some 30%.

TEXACO URSA OIL produced 3 savings in this gas-burning Diesel

MR. A. J. WOLFF, Superintendent of the Elkhorn (Wisc.) Light and Water Commission, reports the following cost-saving results from lubricating with *Texaco Urso Oil*:

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3. Low lube oil consumption—4301 kw-hrs per gallon.

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proper compression and perfect combustion. Lower fuel consumption goes along with lower maintenance costs.

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SOUTHERN POWER AND INDUSTRY

JANUARY
1951



Vol. 69
No. 1

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SOUTHERN POWER & INDUSTRY for JANUARY, 1951



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Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

January, 1951

THE SOUTH AND SOUTHWEST will be host this year to several important expositions and technical meetings of interest to plant engineering personnel. Future issues of SP&I will feature previews of the specific meetings scheduled for Atlanta, Houston, and San Antonio.

The INTERNATIONAL INDUSTRIAL EXPOSITION in the Coliseum at Houston, Texas March 11-17, 1951, will feature power and industrial equipment for all general industrial, power and large service plants.

The Annual Spring Meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS will be held at the Hotel Atlanta-Biltmore in Atlanta, Georgia, April 2-5, 1951.

San Antonio, Texas, will be host on August 21-23 to the Golden Anniversary NATIONAL POWER SHOW of the National Association of Power Engineers. The 68th Annual National Convention of the N.A.P.E. will be held in conjunction with the show.

September 10-14, in Houston, Texas, the INSTRUMENT SOCIETY OF AMERICA will hold the association's Sixth National Instrument Conference and Exhibit.

DEVELOPMENTS IN METALWORKING EQUIPMENT stress shearing operations. Old method of shearing galvanized sheet utilized a continuously rotating cutter so geared as to make one cut each revolution. This was not only expensive but involved a gear change each time some different length of cut was desired. Now an electronically controlled Westinghouse unit, incorporating a phototube, makes accurate cuts of different length and for different production speeds from 30 to 200 fpm.

A PORTABLE HYDRAULIC SHEAR, which can handle 1-in. rod, wire rope up to 1 $\frac{1}{2}$ in., and chain up to 1-in. in diameter, in a cutting cycle of 2 $\frac{1}{2}$ seconds, is noted by IRON AGE. Cutting head of the Manco Mfg. Co. unit weighs only 38 lb. Hydraulic equipment develops 10,000 lb and is semi-portable, with power being supplied by either a portable gas engine or 2 hp motor.

Unit will cut 1-in. diameter log chain with relatively little manual effort. In the utility field it is necessary to renew thousands of feet of power cable up through 3 $\frac{1}{2}$ -in. diameter. To salvage copper and lead involved, cable must be cut in convenient lengths for handling. Special unit will cut 3 $\frac{1}{2}$ -in. lead sheathed power cable in 2 $\frac{1}{2}$ seconds.

USE OF THE CHILDERS CORRUGATED ALUMINUM JACKETING for outdoor lines in power, chemical and other processing plants has passed a total of over 440 outdoor installations, many in the South and Southwest. Low-cost light weight jacketing is a .006 sheet of aluminum, corrugated for extra strength and easy application and backed up with a glued-on asphaltic moisture barrier.

SP&I reported on the extensive Carolina Power & Light Company Lumberton plant installation in the July '50 issue. The aluminum jacketing, a product of the Childers Manufacturing Co. of Houston, Texas, was also extensively used in the power plant modernization at the Kerr Bleaching and Finishing Works, Concord, North Carolina. (See SP&I for December, '50,

REPEAT BUSINESS FOR TENNESSEE, according to the Tennessee Industrial Planning Newsletter, in reporting on the new multi-million dollar developments by du Pont at Memphis and by Quaker Oats at Chattanooga. Both of these companies have long established operations in Tennessee.

The open air type \$7,500,000 du Pont chemical plant near Memphis, scheduled for operation in January, 1952, will produce sodium cyanide. The Quaker Oats Company's Chattanooga multi-million dollar plant will manufacture corn products. Present construction schedule calls for completion in late 1951.

The Tennessee Newsletter stresses that with such previous operational experience in the state, these corporations pay tribute to Tennessee by their continued selection of Tennessee cities as locations for new operations. Tennessee, in turn, has obtained immense economic gains from this "repeat business", as have numerous other states of the South.

Du Pont alone has located in Tennessee, Virginia, North Carolina, and South Carolina the greatest part of its productive capacity for making synthetic fibers, rayon, nylon, and orlon. Altogether, du Pont has made ten separate expansions of its synthetic fiber capacity since the end of World War II, with practically all of this increase being in its Southeastern units.

FRACTIONAL HORSEPOWER MOTOR DEVELOPMENTS as reported by Westinghouse—die-cast aluminum brackets have replaced the traditional cast iron, thus making possible more ventilating holes and reducing bracket weight by two thirds. Increasing ventilation allowed one drip-proof laundry-type motor to run 18 degrees C cooler, which amounts to an output increase of 50 per cent.

The single-phase capacitor motor formerly used for operating chain hoists, is not inherently reversible by plugging, i.e., by reversing the terminals. Usual way to achieve rapid reversal is to cut starting winding back into circuit until reversal is effected and then quickly remove it. New SWITCH-LESS HOIST MOTOR has new circuit and small relay, which are sealed in metal can to give a unit almost free of maintenance requirements.

SPRAYING ORGANIC FINISHES with superheated steam instead of compressed air was reported as a new development in the February '49 issue of SP&I. Paint is both heated and atomized at the nozzle--thus eliminating need for preheating. High viscosity paints can be used and faster work is possible.

A brief up-to-date report on STEAM SPRAYING is featured in this issue. It gives industry a new and more efficient method of applying coating compositions. It does not necessarily provide a better or glossier finish to the product, but does effect large savings in the manufacturer's over-all finishing costs.

There is much interest in steam spray and the number of industrial users is increasing. Some manufacturers, on the other hand, see no over-all advantage in the new method. It is not recommended except for big volume users of finishes who produce their goods on an assembly line.

USE OF SYNTHETIC LUBRICANTS for unusual or severe operating conditions was discussed by Union Carbide and Carbon engineers at the A.S.M.E. annual meeting in New York. Applicational data was confined to UCON, Union Carbide's class of synthetic lubricants.

Lubrication of wheel bearings on tunnel kiln cars was among the HIGH TEMPERATURE APPLICATIONS. Glass fabricators have found the synthetic fluids useful in outboard bearings, on the gears and chain drives of annealing ovens and in the lubrication of hot glass cutoff shears.

The METALWORKING FIELD reported that in lapping stainless steel threads with glass or diamond dust, superior finish has been obtained with the synthetics. Rolling of nickel-silver, copper, sterling silver, brass and aluminum, has been accomplished with good finish and freedom from stains.

Their cleanliness, ease of removal, stability and good lubricating properties have also proved useful in the TEXTILE INDUSTRY where they are being used alone and in formulations for lubricating or conditioning various fibers, including nylon, glass, wool and rayon.

Write the editors for additional information on any of the above items.
SOUTHERN POWER & INDUSTRY 806 Peachtree St., N.E. Atlanta 5, Ga.



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Spiral Conveyors will handle many kinds of material with clean, dustless operation. No return strand. Standard types—also many special designs and applications. Interchangeable with other makes—built to industrial standards.



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Electric Vibrating Feeders provide absolute control over feeding operations. Open or closed pan, or tubular decks. Capacities from a few ounces up to many tons per hour.



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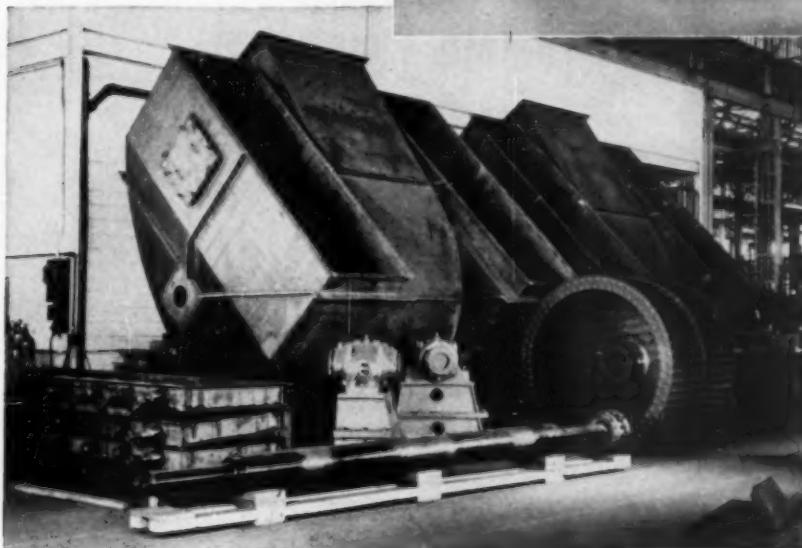
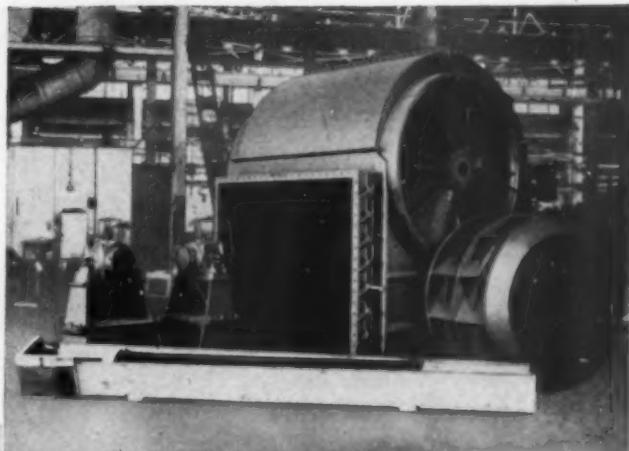
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Contra Costa Station at San Francisco

Bechtel Corporation, Engineers

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↑ Above is shown one of the 6 American Blower Forced Draft Fans used on each boiler in the new Contra Costa Station. Each fan is 180,000 CFM at 100° static pressure.

← The photograph at the left shows 2 of 6 American Blower Induced Draft Fans for the same station. Each has a capacity of 313,000 CFM at 420° at 10.1° static pressure. The new Contra Costa Station of the Pacific Gas and Electric Company will be used to supplement their very large hydro and steam generating electrical system.

That a vast majority of these utilities depend on us for important equipment, is a tribute to the fine performance of American Blower Products as well as to the engineering skill available through our strategically located branch offices.

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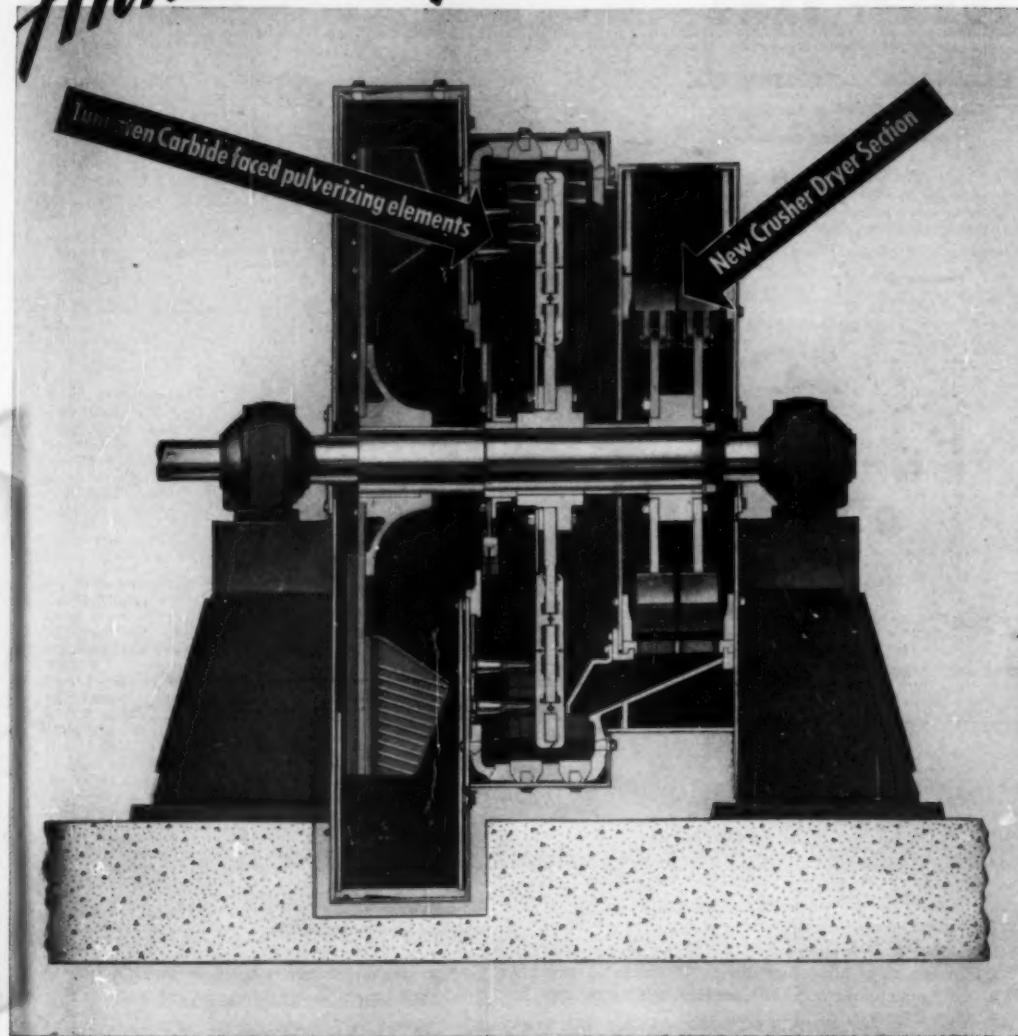
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No capacity reduction with increase in moisture.

In the crusher dryer section where coal is crushed to a fine granular state, approximately 40% through a 50 mesh screen, representing about 5% of the work to be done, free moisture is evaporated from coal. The crusher dryer section acts as a flash dryer. Coal then enters pulverizing section where 95% of the work is done, completely free of moisture which would affect pulverizer performance and capacity. The crusher dryer section is designed with ample capacity for the highest moisture coals and as moisture is evaporated before coal enters the pulverizing section, moisture has no effect on pulverizer capacity or performance.



Tramp iron, iron pyrites and other foreign materials in coal rejected.

The crusher section of the pulverizer rejects tramp iron, iron pyrites and other hard foreign substances in the coal, preventing any materials from entering the pulverizer section which could cause damage.



Pulverizing elements faced with tungsten carbide.

Pulverizing elements are faced with tungsten carbide, assuring long periods of service without outage for maintenance and resultant low maintenance costs. Numbers of Riley pulverizers equipped with tungsten carbide faced parts have been in operation over two years without showing appreciable signs of wear, indicating at least several additional years of service before replacements are necessary. Over 40,000 tons of coal have been pulverized by a mill having a six-ton per hour capacity with indications that 150,000 tons will be pulverized before requiring replacement.



Fineness sustained over years of operation.

Because the life of the tungsten carbide faced pulverizing elements is so long, fineness of pulverization is maintained over years of operation. Tests on existing installations show no falling off of fineness after over two years of operation. No adjustments are necessary to maintain fineness.



Unusually high capacity per unit of space.

The improved Riley pulverizers have an unusually high capacity per unit of floor space and height, permitting their installation under crowded space conditions. Because of their lower weight and quiet vibrationless operation, heavy foundations are not required.

If you are interested in coal pulverizers, we believe you will find the article "THE USE OF TUNGSTEN CARBIDE IN COAL PULVERIZERS," presented at the fall meeting of the A.S.M.E., well worth reading. We will be happy to mail a copy to you without charge on request.

A survey of your Power Plant by a consulting engineer will possibly show ways of making surprisingly large economies in your power plant costs.

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ECONOMIZERS WATER-COOLED FURNACES • STEEL-CLAD

... it will pay you to visit
modern Riley Installations
before purchasing Boiler or
Fuel Burning Equipment

SOUTHERN POWER & INDUSTRY for JANUARY, 1951

What part of \$7,200,000 can you afford to throw away?

When you buy a combustion control system, the second best system is not good enough. No matter what it costs, it is too expensive. Too little air means unburned fuel, while too much air means heat wasted up the stack. Slight variations in either direction can, in a few years, cost more in wasted fuel than boilers and control system together.

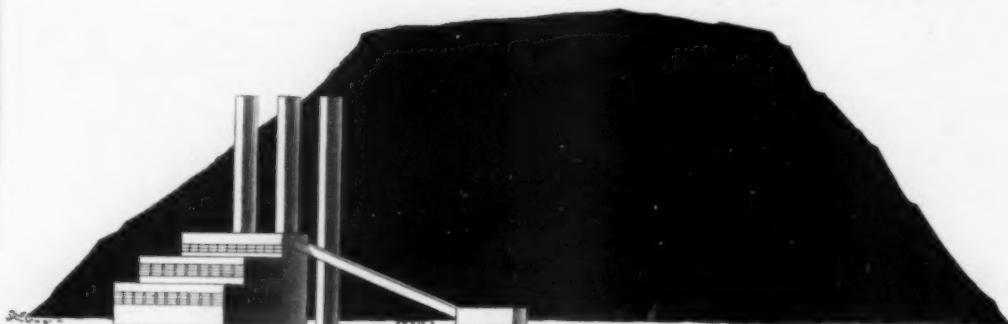
Consider, for example, a 100,000 lb/hr boiler, running 24 hours a day, 300 days a year. Coal consumption will be roughly 5 tons an hour. At \$10.00 a ton—a moderate price for coal today, even where freight rates are low—the fuel bill will be \$1,200.00 a day, or \$360,000 a year. Such a boiler will consume \$7,200,000 worth of fuel in 20 years—and 20 years is a conservative estimate of the useful life of boiler and control.

If, in burning that fuel, your control system supplies too little air, combustion is incomplete. If it supplies too much, you spend money to heat up the sky. Either way, you lose.

Hagan Automatic Combustion Control Systems are designed for *precise* control. When they are placed in service, they are adjusted by Hagan's experienced combustion engineers, who make sure that you *get* the precision which is built into the control system.

Hagan controls are used on every size of boiler from 5,000 pounds per hour at 3 psi to 1,340,000 pounds per hour at 1,800 psi. They have been applied to boilers burning oil, coal, gases of various types, even to boilers burning sawdust—and always with satisfactory results.

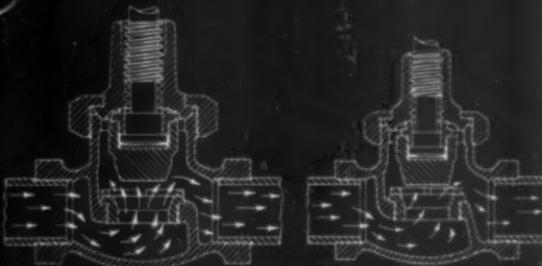
Our engineers will be glad to give you full information on Hagan control systems. Write to Hagan Corporation, Hagan Bldg., Pgh. 30, Pa.



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METALLURGICAL FURNACE CONTROL SYSTEMS
THRUSTOR^Q FORCE MEASURING DEVICES

POWELL gives you *Full Flow* in a Throttling Valve



COMPARE

the flow characteristics of the new Powell "W.S." Valve (left) and the ordinary globe valve (right). Note the extra large opening through the seat (nominal pipe size) and the greatly increased lift of disc, when wide open.

This is actually a dual service valve in that it can be throttled to any desired degree, yet, when wide open, permits FULL FLOW through the body. Thus turbulence and pressure drop are reduced to a minimum—a triumph in engineering that exemplifies Powell's continual leadership in the field of industrial valve design.

Powell "W. S."
Bronze Globe Valve
Fig. 2608

Write for folder giving full description of the many advanced engineering features of this valve.

POWELL

The WM. POWELL CO., 2525 Spring Grove Ave., P. O. Box 106, Station B, Cincinnati 22, Ohio.

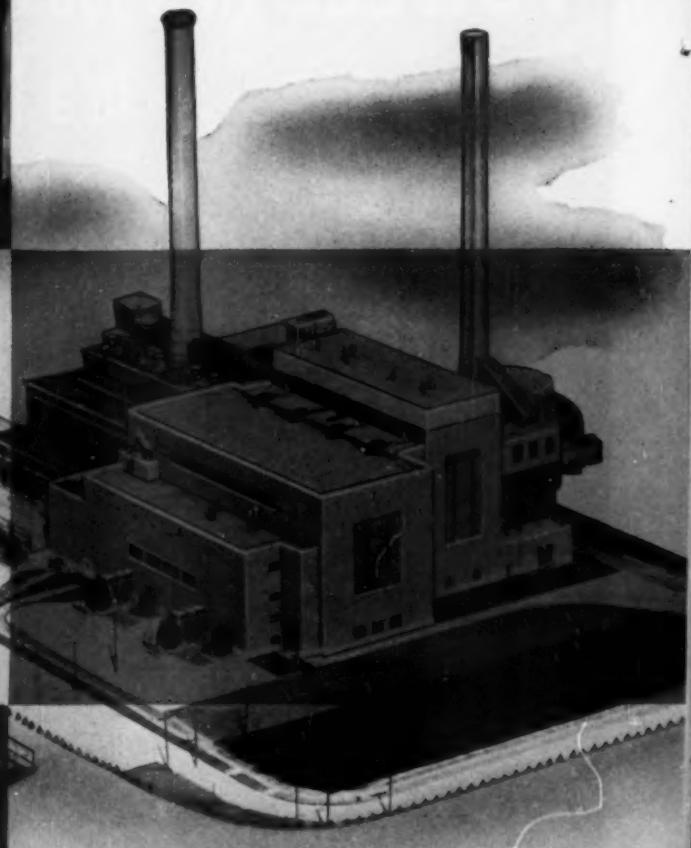
BARBADOES BOILERS GET

Two of fourteen Yarway Unit Tandems in the Barbadoes plant. These are hard-seat-hard-seat combinations.



Yarway Unit Tandem valve sectioned through seatless (sealing) valve.

Yarway Unit Tandem valve sectioned through hard-seat (blowing) valve.



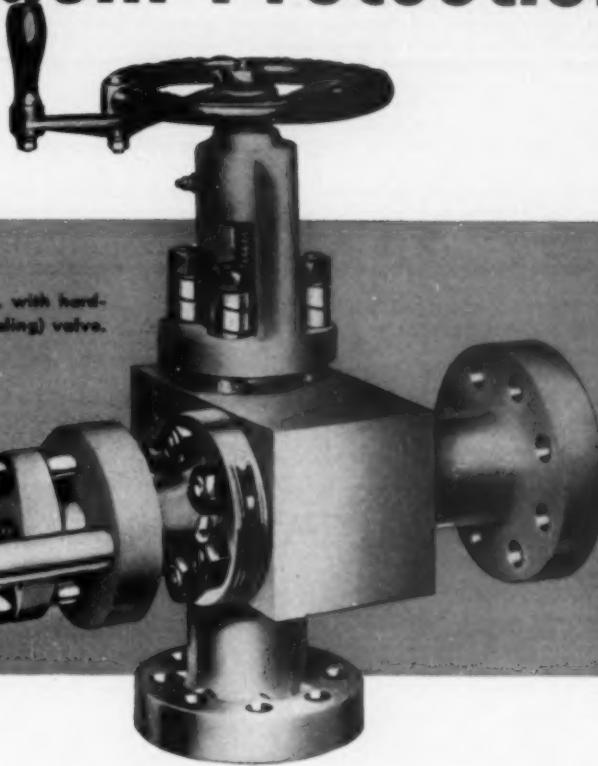
■ When a company has a \$25,000,000.00 stake in the future such as Philadelphia Electric Company does in its Barbadoes Station —then protects the boilers of that plant with Yarway Unit Tandem Blow-Off Valves—it's significant of the dependability of those valves.

Barbadoes is a fine example of modern power plant engineering, demonstrated by the fact that only 11 men per shift are needed for operating this 180,000 KW station.

YARWAY

SOUTHERN POWER & INDUSTRY for JANUARY, 1951

Unit Tandem Protection



Yarway Unit Tandem Blow-Off Valves also are a good example of steam equipment engineering—used in more than 4 out of 5 high pressure boiler plants in the country.

Rugged construction makes Yarways strong and tough enough to withstand severest blow-down conditions. Metallurgical improvements make them resistant to the reactions of periodic acid wash. *Outages are rare where Yarway boiler valves are used.*

Unit tandems are available in various combinations to meet all pressure and service requirements.

Write for Bulletin B-433 for full details on Yarway Unit Tandems. For lower pressure blow-off valves, write for Bulletin B-424.

YARNALL-WARING COMPANY

Home Office: 116 Mermaid Ave., Philadelphia 18, Pa.
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STEAM PLANT EQUIPMENT

WHERE TO GET IT And How to Do It

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724 DUST REMOVAL — Bulletin 4324, 40 pages — describes mechanical draft equipment — heating, ventilating, drying, air handling and purification equipment, dust collectors and fly ash precipitators, and dust in the handling of coal. — AMERICAN BLOWER CORP.

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778 STEAM GENERATORS — Bulletin 1773, 18 pages — Gives information on a complete line of steam generators; discusses dry air problems, with tables on relative humidity and rates of moisture loss. Data on operation and installation of electric and air heated models. — ALBRIGHT-STRONG MACHINE WORKS.

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378	1000	1019	1035	1040	1045	810	811	812	813	814	815	816	817	818	
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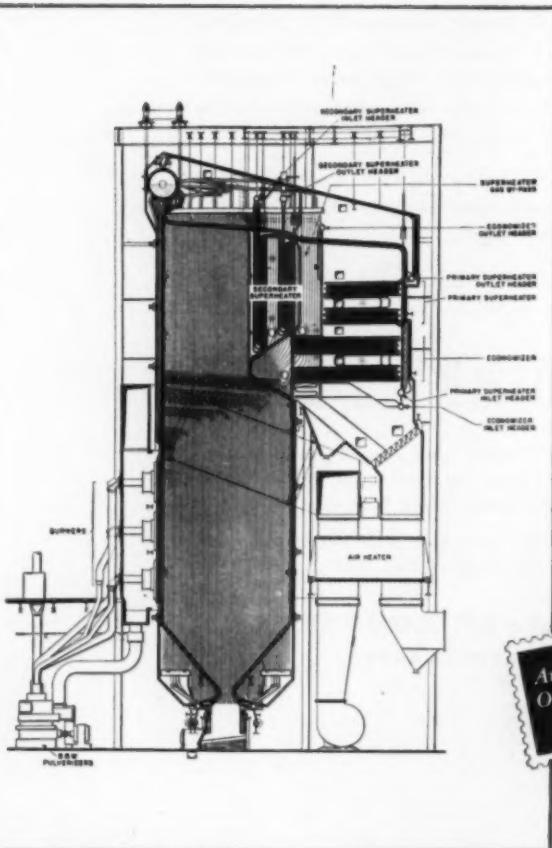
A fine example of how B&W engineering meets specialized requirements of modern central stations is the new 88,000 kw Lumberton (N. C.)

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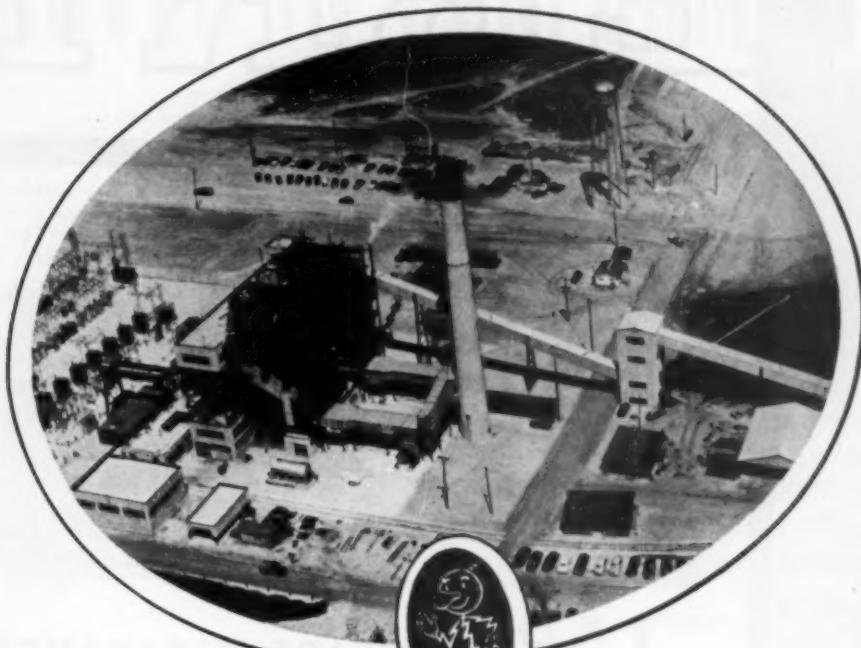
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Another Cost-Saving
Outdoor Installation
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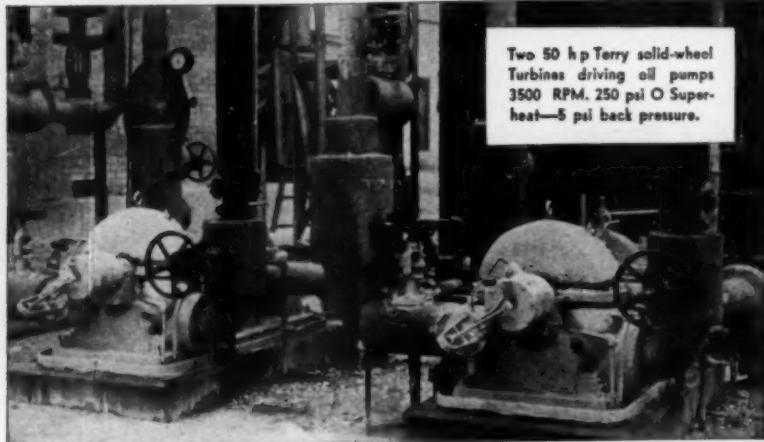
Aerial view of Lumberton Steam-Electric Plant showing outdoor installation of two B&W Radiant Boilers. Designers and construction supervisors: Ebasco Services, Inc.

Helping Industry Cut Steam Costs Since 1867



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T-1174

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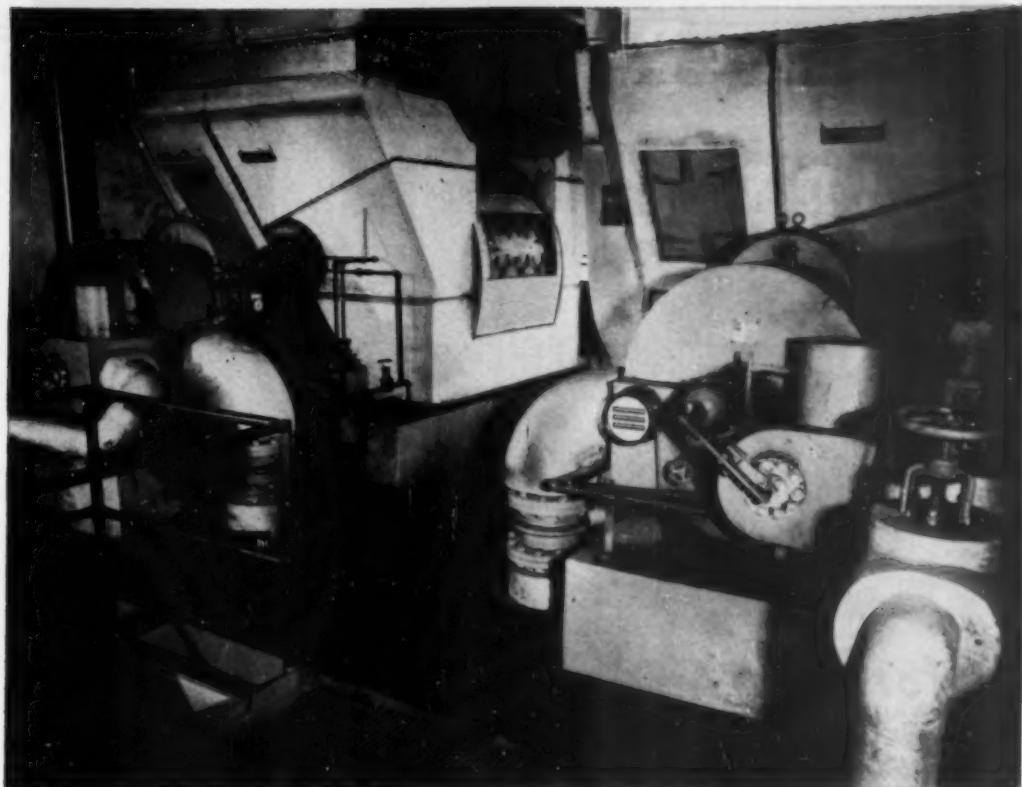
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FORCED DRAFT

AIR WASHING
COOLING

AIR TEMPERING
HEATING

INDUCED DRAFT
PRESSURE BLOWING

EXHAUSTING

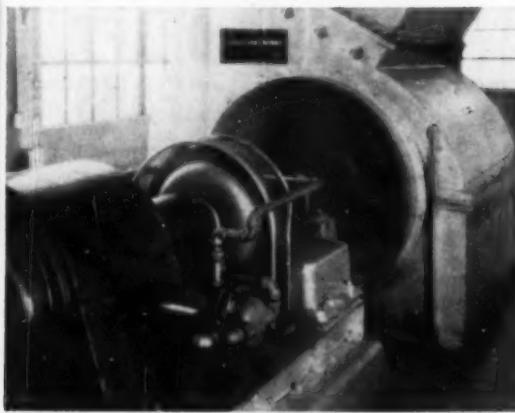
Consumers Power Again Selects

CLARAGE FANS



... for Both Forced and Induced Draft

Built in 1940 — enlarged to practically twice capacity in 1949 — and *both times* Clarge HEAVY-DUTY equipment was chosen for mechanical draft in this John C. Weadock plant, Bay City, Michigan.



One of the four Clarge forced draft fans; each 100,000 c.f.m. at 12" S.P. There are also two Clarge induced draft fans included in this latest Weadock power plant installation; each with a capacity of 330,000 c.f.m. at 17" S.P., 350° F.

All told, Consumers Power Company has had 24 years of experience with Clarge forced and induced draft fans. Other installations include: East Ave. Station, Kalamazoo (1926); Elm St. Station, Battle Creek (1938); Bryce C. Morrow Station, Comstock, Michigan (1939).

Specialists in this exacting field of mechanical draft, we have facilities to meet all requirements. To date over 3,000 power plants are Clarge equipped. If you are looking for the *best in performance and dependability*, it will pay you to consult with us.

CLARAGE

**-HEADQUARTERS for Air Handling
and Conditioning Equipment**

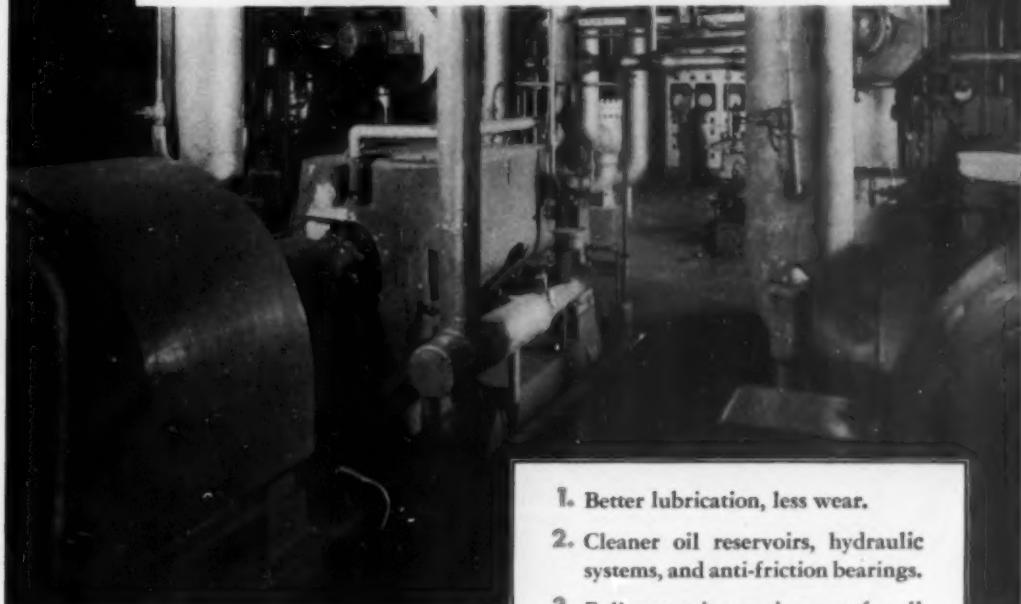


in All Principal Cities

Sales Engineering Offices

For pumps, compressors, and other oil-lubricated auxiliary equipment

Gulf Harmony Oil can help you cut costs 3 ways



1. Better lubrication, less wear.
2. Cleaner oil reservoirs, hydraulic systems, and anti-friction bearings.
3. Full protection against rust for all oil-bathed surfaces.

Gulf Harmony Oil provides the kind of protection that means lower maintenance costs and freedom from lubrication troubles. Users report that it is the best lubricant they have ever used for pumps, compressors, blowers, and other oil-lubricated plant equipment. They also report excellent performance in hydraulic applications.

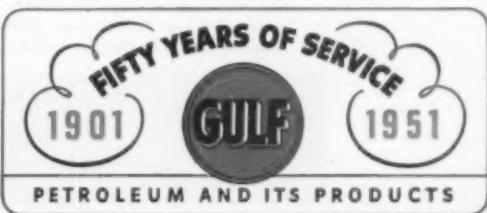
Because of outstanding oxidation stability, Gulf Harmony Oil has exceptional resistance to sludging, keeps bearings and lubricating systems clean.

Gulf Harmony Oil has been fortified to provide an effective rust preventive film. Now you can be sure of full protection against rust for all oil-bathed surfaces. It is particularly effective for ball and roller bearings operating under wet conditions. And it separates readily from water.

This outstanding oil provides more effective protection for bearings, gear units, hydraulic mechanisms and compressor cylinders. Available in a wide range of viscosities.

For complete information on Gulf Harmony Oil, call in a Gulf Lubrication Engineer today.

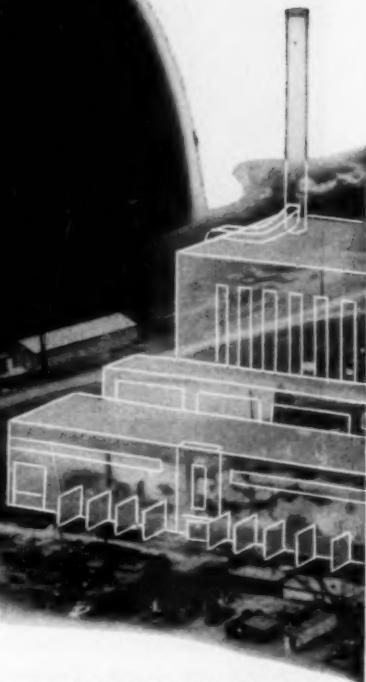
Gulf Oil Corporation - Gulf Refining Company
Gulf Building, Pittsburgh, Pennsylvania.



vision with a past,



The original Sunbury Steam-Electric Station which was built by Thomas A. Edison in 1883.

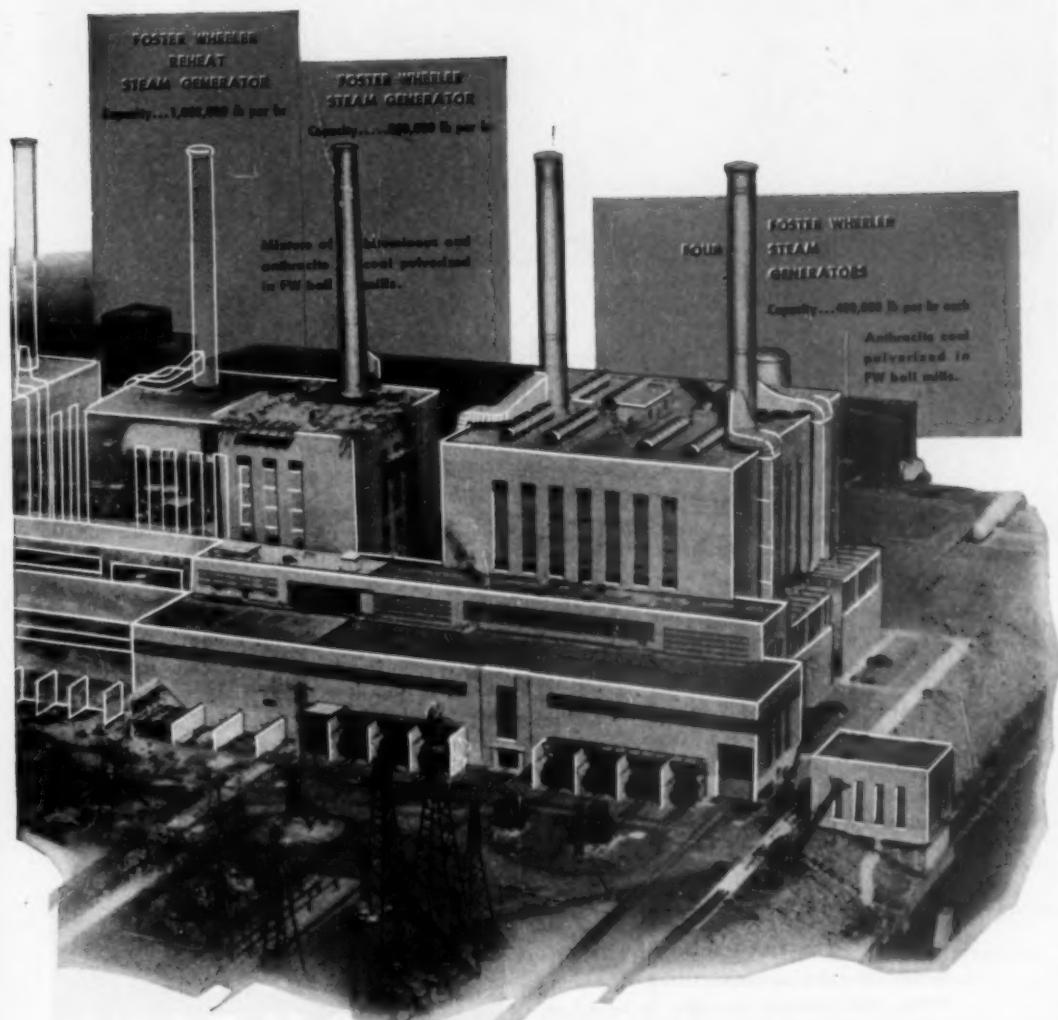


The vision began to take form on Independence Day, July 4, 1883 at Sunbury, Pa. when Thomas A. Edison threw the switch of the first commercial steam-electric station in the world. This was one of the epochal events foreshadowing the scientific, industrial, and economic miracles of the 20th century. The new Sunbury Steam-Electric Station near Sunbury, Pa. reflects both the tradition of our American past and the hope of tomorrow as its fine buildings emerge from the blueprint stage to provide an abundant source of power for factories, offices, farms, and homes in Central Eastern Pennsylvania.

The earliest section which houses four Foster Wheeler 400,000 lb per hr steam generators providing steam for two 75,000 kw turbine generators is the world's largest power plant burning pulverized anthracite. The first extension houses a 100,000 kw turbine generator and an 800,000 lb per hr Foster Wheeler steam generator. Engineering is under way for the installation of an additional Foster Wheeler 1,000,000 lb per hr reheat steam generator designed to serve a 125,000 kw unit. When ultimately completed, the station is expected to have a capacity of more than 700,000 kw.

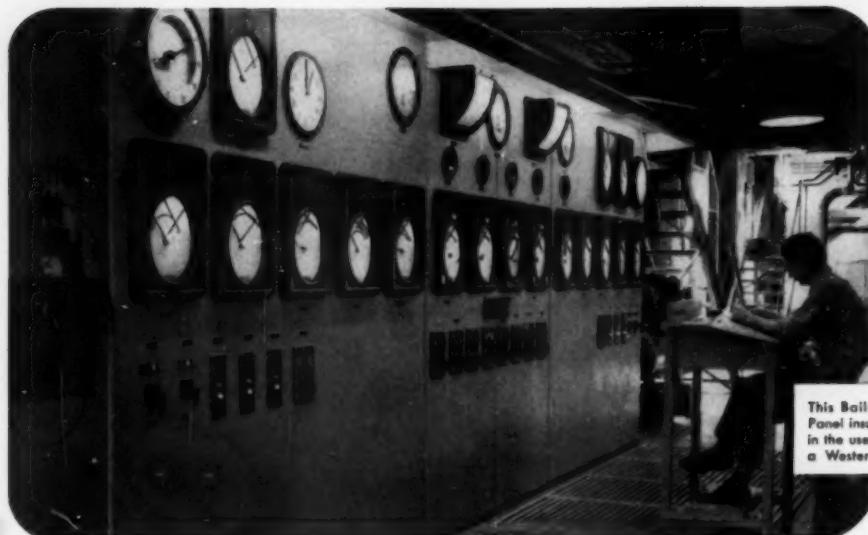
FOSTER WHEELER CORPORATION • 165 BROADWAY, NEW YORK 7, N.Y.

present, and future



YORK 6, N. Y.





This Bailey Boiler Control Panel insures high efficiency in the use of Fuel-Dollars at a Western Chemical Plant.

What's Your Fuel-dollar Efficiency?

A dollar's worth of fuel has the *same potential energy*, no matter who's boiler it fires. But how much of the energy actually gets converted to a usable form depends on how you operate your boiler.

That's where Bailey Controls can help. And, here's why, we believe, you'll get better fuel-dollar efficiency with Bailey:

1. Complete Range of Equipment—fully co-ordinated. You need never worry that a Bailey Engineer's recommendation is slanted in favor of a particular type of equipment, just because he has a limited line to sell—or that Bailey will pass the buck for efficient control; we offer *complete* boiler control systems.

2. Engineering Service—backed by experience. No other manufacturer of instruments and controls can offer as broad an experience, based on successful installations involving all types of combustion, flow measurement and automatic control.

3. Direct Sales-Service—conveniently located near you. Bailey Meter Company's Sales-Service Engineers are located in more

industrial centers than those of any other manufacturer of boiler control systems; you get prompt, experienced service with a minimum of travel time and expense.

For better fuel-dollar efficiency—for more power per fuel-dollar, less outage and safer working conditions, you owe it to yourself to investigate Bailey Controls. Ask a Bailey Engineer to arrange a visit to a nearby Bailey installation. We're proud to stand on our record: "More power to you!"

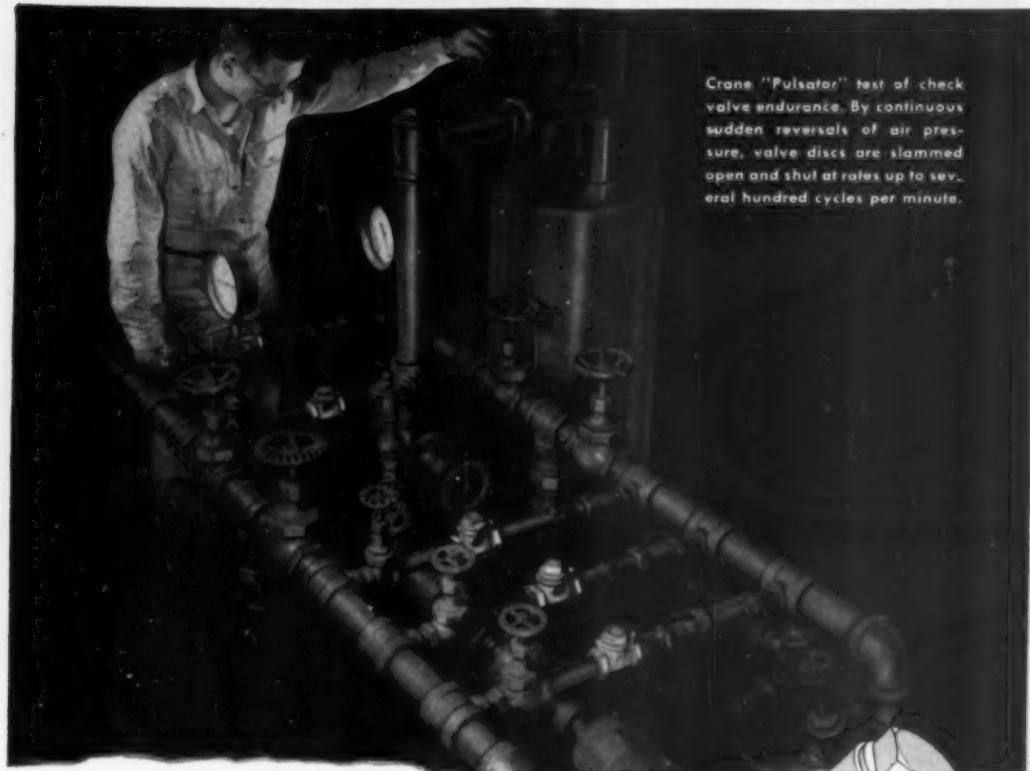
A-109-1

BAILEY METER COMPANY

1028 IVANHOE ROAD
CLEVELAND 10, OHIO

Controls for Steam Plants
COMBUSTION - FEED WATER
TEMPERATURE - PRESSURE
LIQUID LEVEL - FEED PUMPS

More **CRANE VALVES** are used than any other make



Crane "Pulsator" test of check valve endurance. By continuous sudden reversals of air pressure, valve discs are slammed open and shut at rates up to several hundred cycles per minute.

How Many Checks in a Good Check Valve?

You don't buy them that way, but that's what finally determines the value of check valves in your pipe lines.

That's why Crane is so completely equipped for accurately pre-testing valve performance. For instance, "wearability" of check valves is tested by opening and closing the valves continuously on various fluids under conditions of actual service. Special equipment is used to accelerate these tests to equal many years' service in a short period. Countless tests like this—of materials, designs, and finished products—insure the superior performance values that mean lower piping costs for users of all Crane valves and fittings.



This new regrinding Brass Swing Check design typifies Crane's continuing product development for better valve performance, lower piping maintenance costs. For increased flow capacity . . . for fast, positive closure on backflow . . . for easier servicing without removing valve from line . . . get a demonstration of these 200 and 300-Pound Y-Pattern Check Valves. Phone your Crane Representative, or ask for literature.

CRANE VALVES

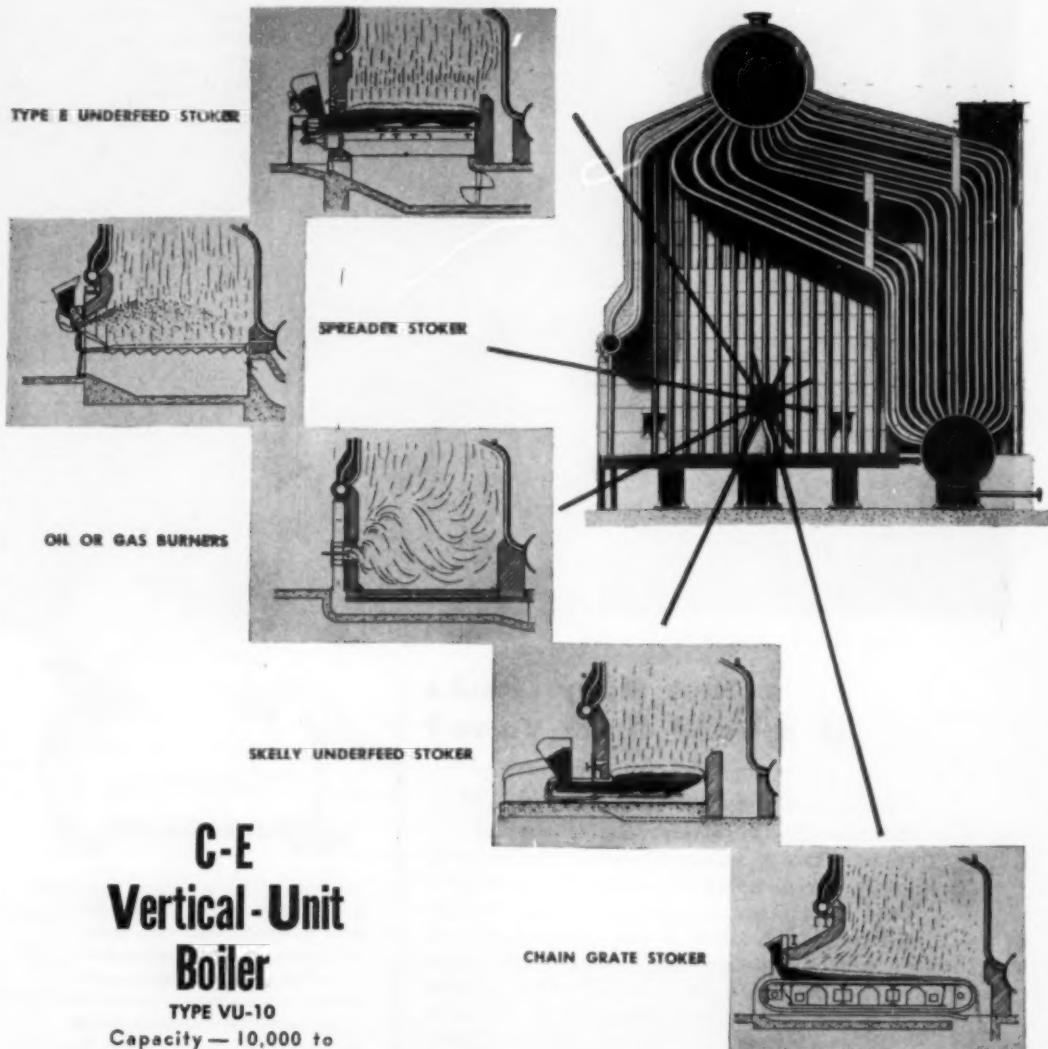
CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

SOUTHERN POWER & INDUSTRY for JANUARY, 1951

For every fuel market and every type of load there is one best method of firing. The selection of that one best method for the fuel and load conditions of a particular plant calls for judgment based on broad experience and free from any incentive to favor one type of fuel burning equipment over another.

The Type VU-10 Boiler is designed for five fully standardized methods of firing—spreader stoker, single-retort underfeed stoker, chain grate stoker, oil or gas burners. The furnace design is such that any of these methods may be substituted for any other should a change in the fuel market make it advantageous.



C-E
Vertical-Unit
Boiler

TYPE VU-10

Capacity — 10,000 to
60,000 lb. of steam per hr.

COMBUSTION ENGINEERING

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

Why buy a Boiler Unit piecemeal?

A piecemeal boiler unit is one in which some of the major components are purchased from different manufacturers.

There is no assurance . . . certainly no protecting guarantee . . . that the resulting assembled compromise will meet your performance requirements. If you buy piecemeal, you must accept the uncertainties inherent in divided responsibilities for overall results.

That is why it will pay you to investigate the Vertical-Unit Boiler, Type VU-10. Here is a completely integrated unit . . . boiler, water-cooled furnace, setting and fuel burning equipment . . . available from one manufacturer — Combustion Engineering—Superheater—a recognized leader in both the fields of fuel burning and steam generation. From the initial design stage, the relationship of

each of the components, one to the other, has been so developed as to provide the highest possible degree of correlation and standardization. And . . . of prime importance to the buyer . . . the overall performance is underwritten by the C-E sales policy of "one contract, one guarantee, one responsibility."

So—buy *your* next boiler as a *complete* unit . . . the VU-10. Enjoy the peace of mind that comes from the knowledge that you have an installation for which one manufacturer—Combustion Engineering—Superheater — is responsible for fulfillment of performance guarantees. Moreover, you will be able to count upon a reliable source for whatever service or spare parts you may require during the many years that represent the useful life of a modern steam generating unit. B-440

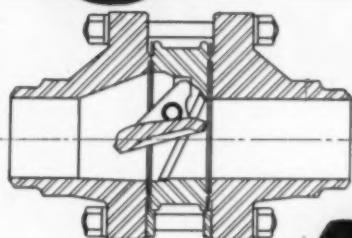
— SUPERHEATER, INC.

200 MADISON AVENUE, NEW YORK 16, N. Y.



FOR HIGHER PRESSURES

3 Piece Tilting-Disc Check Valve



**Has Removable Center Section
for Quick and Easy Replace-
ment of Operating Parts**



Here's a Tilting-Disc Check Valve designed specifically for higher pressures. Its construction permits replacement of operating parts, if ever necessary, without removal of entire valve from the line. Once the studs between inlet and outlet sections of the body are taken out, the entire center section (containing disc, seating face and hinge pins)

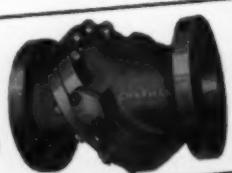
can be removed. Replacement of center section is fast, easy — an important advantage.

Important, too, is the smooth, easy operation obtained by the tilting-disc design. The balanced disc is held on the open stops by the velocity of the medium being handled. There's no slamming on closure to cause destructive pipe line stresses.

Write for complete description.

The Chapman Valve Mfg. Co.
INDIAN ORCHARD, MASSACHUSETTS

STANDARD
2-PIECE
TILTING-DISC
CHECK VALVES
are available in either
iron or steel for all
pressures.



Timely Comments

“The Way to Greater Prosperity for the South”

SASI Faces Tough Fight

tough uphill fight to continue its basic functions. Furthermore, the SASI long range regional development program, which in the past has led to a number of significant advances in the South, seems headed for sharp curtailment or virtual abandonment.

Small Budget

The most astonishing fact revealed by the SASI was that its present annual budget is less than \$15,000—considerably less than the operating fund available to development groups in many small Southern cities. “Our work has been directed at such broad problems and has had such wide influence that most people just assume we have a large budget,” SASI Director H. McKinley Conway, Jr., explained. Actually, he said, “The SASI has never had anything approaching an adequate budget. Each time business men have analyzed our operations, they have advocated a budget of not less than \$25,000 per year. We know that we could invest many times this amount in a highly-effective manner.”

SASI has been able to carry on for ten years only because many Southern leaders have been willing to contribute their time and energy without expecting compensation, Mr. Conway explained. “On numerous occasions we have had 100 to 200 top business men and scientists from throughout the South assemble, spend several days studying a problem, and then have their findings printed, all at their own expense,” he said. Last year, the Atlanta office of SASI distributed nearly 40,000 research reports and bulletins—an average of about 150 for each working day—with a staff of only three, Mr. Conway reported.

Activities

SASI has had a hand in most of the basic advances made by the South in the past ten years. In fostering technological progress, SASI has helped found a number of research centers, including the Southern Research Institute, of Birmingham. In education, SASI helped develop the regional plan now being carried on by the Southern Governors Conference. In indus-

FIGURES released by the Southern Association of Science and Industry reveal that the non-profit agency founded in 1941 to promote the industrial and scientific development of the region faces a

try, the Association has conducted a continuous campaign to identify opportunities for expansion and diversification of existing industries or for the establishment of new ones.

Association Support

Commenting on the SASI's reluctance to reveal its financial plight, Mr. Conway said that the Association feared that releasing such information might reflect on Southern industrial leadership and handicap efforts to interest national business firms in locating new activities in the region. The willingness of business firms to support such cooperative efforts might be taken as an index of economic health, he said. It was, the SASI officer admitted, very embarrassing to reveal that the two largest annual contributions it receives come from New York firms, while many Southern companies have yet to give any support. The SASI's latest financial statement shows that it is now supported by some 200 Southern firms which make annual contributions averaging less than \$75 each.

Pointing out that SASI has never accepted Federal funds for any of its operations, although the Government has taken over many such activities, Mr. Conway said “We believe that most business men want to keep this activity free and independent and, if properly approached, will support it. We still hope that all Southerners interested in the future of the region will do their part by holding membership for only \$5 per year, while business memberships range from \$25 upward. The only qualification required is a sincere interest in the progress of the South.”

“The next few months will be critical ones for us,” the SASI Director stated. “If the people of the region respond as we believe they will, now that our problem has been made public, the Association will soon find itself on firmer footing than ever and will be able to tackle whatever projects may arise.”

Statement of Objectives Available

The Southern Association of Science and Industry has prepared a brief statement of its objectives and provisions for membership in the form of a folder “The Way to Greater Prosperity for the South.” The Atlanta office at 5009 Peachtree Rd. will be glad to send copies to any interested individuals, firms, or organizations.



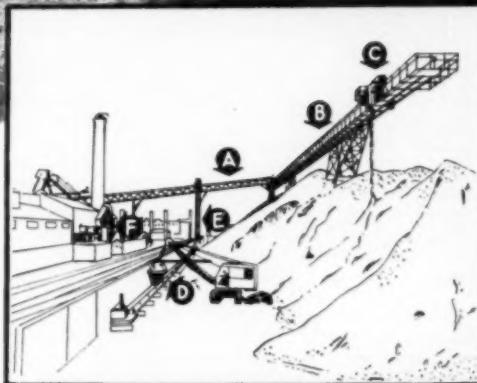
Another Example of Continental's Belt Conveyors at Work -

The Southern Cement Company's conveying and elevating system in their Birmingham Plant incorporates several advanced features of design—one of which is illustrated above and to the right.

Continental's engineers are skilled in "practical engineering" — the kind that results in installations designed for economical, dependable operation and long life. All Continental products — whether especially designed systems and equipment or standard equipment and accessories — show the value of practical engineering.

- Call Continental engineers in on your job — or specify Continental on your next replacement order.

Write for Belt Conveyor Data Book ID-481-A



Slag is carried to storage by Conveyors A and B and discharged to storage at any point by self-propelled Tripper, C. As material is needed for processing, it is loaded by shovel onto Reclaim Conveyor D, raised by Bucket Elevator E, and discharged onto return side of Conveyor Belt A, which delivers it to Plant F.

INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY

ENGINEERS



ATLANTA • DALLAS • MEMPHIS • NEW



MANUFACTURERS

Industry Speaks

The World is Not Coming to an End

Adapted from a talk presented by Mr. W. M. Shepherd, vice president, Arkansas Power & Light Company, before the Petroleum Electric Power Association, Hot Springs, Arkansas, November 28, 1950.

THESE are interesting times. So many things are happening all over the world that we do not even have time to comprehend what our own lives are for in the world. We are confused.

In the first place, we are indicted as being a part of what is probably the most conceited generation the world has ever produced. Just because a few scientists have discovered how to control the tremendous energies of nuclear fission, we think that makes us the smartest people of history and also that the use or misuse of the atomic energy will probably destroy the world.

How little can thinking get? How faithless can a people's philosophy become?

We seem to become more frantic because we cannot foretell the future. Man never has been able to see tomorrow except in the depth of his religious faith, and how little we seem to have.

The world is not coming to an end. There is too much left to be done in God's plan for the Universe. Man was put upon the earth to multiply, to grow in knowledge and to bring about a slowly evolving civilization which, with each generation, approaches nearer the goal.

What is that goal? A world of love which makes possible all things good: peace, health, happiness, labor, and brotherhood. So let's have faith. History teaches that it is well that we should.

We in America should be especially thankful for our blessing. There are 2,200,000,000 people in the world, but only 200 million, or thereabouts, have any experience to comprehend what we mean when we say freedom for the individual.

Freedom of worship; Freedom of speech; Freedom of opportunity; Freedom of the press; Freedom to select their leaders—only this continent and tiny groups in other scattered spots in the world have these.

They add up to only the two hundred million, so we have a long way to go before there can be One World



W. M. Shepherd

with freedom and liberty for all. It will take generations of faith and years of labor before knowledge has conquered evil.

Americans should be thankful that our forefathers founded a nation that could operate under a system of political democracy and of free competitive business activity. Under it we aim to give a fair chance to all our people: workers, owners, farmers, business and professional people, and to all citizens everywhere.

Admittedly our system has its faults. We have yet to reduce its tendencies to ups and downs in prices and jobs. A few monopolies exist and competition is not always free. There are people in our nation who live in poverty.

However, within less than 100 years, through our free, dynamic system, we have learned so many new and better ways of living together and producing goods that:

We have increased our output per man-hour of work more than five times from 27 cents to \$1.41 (today's dollars).

We have reduced our work week from 70 hours to 40 hours.

We have increased our national income 26 times.

We have given ourselves the highest standard of living ever known by any people, in any country, at any time.

Plan for More Manpower

What to Do Who To Look For Where To Look How To Look

We are again entering a period of manpower shortage. What should you know and what should you do to get your share of the good workers?

RECENT events have seriously affected the "Selection Scene" for personal departments all over the country. Replacement of all those capable, healthy, red-blooded, and draft-vulnerable men now on payrolls will become an increasing challenge to the resourcefulness of men in the personnel field.

For those who had no personnel experience in industry during the past war, there is no bag of tricks in which to reach for a wand that will transform draft-age men into middle-aged men or women. For those who have had such experience, theirs is the enviable position for they should be better prepared than last time to select suitable replacements—replacements who, if we want continued progress, must maintain a most unusual productivity rate.

It's a perfectly amazing fact that over the past 50 years, we have been operating under a dynamic economy which has increased productivity on an average of 3% per man-hour in manufacturing industries. Seventeen of these 50 years have been depression years; 9 of them war years; 9 more were years of war boom, and only 15 were years of ordinary peace-time prosperity.

There is little doubt that a great factor in this increased productivity has been due to technological changes. And, in a sense, many of these technological changes have come about as a result of high-gearred war-time economy.

These facts are pointed out for this reason—regardless of wartime economies, we have been able with the people available to somehow maintain that average increase in productivity. We should be even better equipped this time if the present spectre of a global conflict becomes a reality.

Many have already faced the problem of replacing men. Perhaps replacing is all that has been done. The fact remains that we should know **What To Do, Who To Look For, Where To Look and How To Look.**

What To Do

At this date, a detailed personnel inventory should be completed or in the making.

Primarily, key personnel should be known—those who are absolutely necessary for continuation of operations within our plants. We should have available a list of critical occupations and know, beyond any doubt, those key employees who can be deferred and



DON'T CLOSE THE GATES. AN INTELLIGENTLY ACCUMULATED BACKLOG OF APPLICATIONS WILL BE NEEDED SOON.

By K. F. Bevan, Jr.

Vick Chemical Co.
Greensboro, N. C.

those for whom no deferments will be granted.

For those between 18 and 26, personnel inventories should include military classifications. Briefly, they are:

Class I: Available for Military Service. Members of the Armed Forces, the Coast Guard, the Coast and Geodetic Survey, and the Public Health Service; Members of Reserve Components or Students taking Military training.

Class II: Deferred because of Occupational Status.

Class III: Deferred because of Dependency.

Class IV: Deferred specifically by law or because not suitable for Military Service.

Class V: Over the age of liability for military Service.

We should also get selective service numbers. These numbers will be extremely important indicators during the coming months, because draft boards are no longer using the "fish bowl" technique of the last war. Each number has a very definite significance and the meaning for each block of numbers should be known at a glance.

Here is an example: Selective Service Number 31-10-28-109

The first block is the number

representing North Carolina. (It represents the numerical position of the state in which the individual is registered.)

The second block indicates that the registrant's Board within the state is the 20th.

The third block represents the year in which the registrant was born.

The fourth and final block informs us that this registrant will be the 109th person to be called from those born in the same month in 1928.

Men selected from the ages of 26 down to 18 will, of course, be taken first by birth year; second, by month of the year in which born; and third, in alphabetical order.

For all other groups—26 to 35 and 36 to 65—we should be cognizant of age, number of dependents, any specialized skills, and whether or not the individual is a member of a reserve unit. This information is essential in predicting who is going to go and what type of replacement will be needed.

A second and very important preparatory measure is to know thoroughly job descriptions for those who might have to be replaced. Then a statue of minimum limitations should be established for each of those jobs. By this is meant a thorough study of jobs to determine what restrictions may be dropped in order to allow, for instance, a handicapped worker to perform a job.

Who To Look For

Here is a challenging problem. Perhaps many in the personnel field will have the same answer as did Chico Marx when he tackled a French menu and the headwaiter asked politely: "What's your pleasure?"

"Girls," was Chico's ready reply.

In all probability they, too, will be our "pleasure" in looking for employees to replace those men who will be drafted in the coming months. What types of people, then, should be sought as capable replacements for men called into the service?

How about men over 40? . . . Those on retired list? . . . What about handicaps? . . . Females?

. . . Part-time high school students? . . . There may be others.

Each organization must know its own needs and what type replacements can do the job. One thing to remember—concerns are bound by law to take back an employee who (1) enters the service directly from them; (2) returns to them within 90 days following his discharge; but he does not necessarily have to be employed in the same job he left. However, it must be one which will utilize his abilities and aptitudes and be comparable to the one he left.

Where To Look

As Harry King Tootle puts it in his book, *Employees Are People*:

"You can advertise, deliver pep talks to high schools and colleges, tap a dozen other sources, but the best source of all is the one which has usually been years in developing—the policy of your company in regard to the pay and welfare of those who work for it."

Paul W. Boynton agrees, in this manner, in his book entitled, *Selecting the New Employee*:

"No better evidence of good employer-employee relations can be given than the willingness of employees to recommend your business to other people. If you have built up a good working staff, your employees are likely to bring in other good people, for likes seek likes. This is as true of the small company as it is of the large organization."

A second source of employees is from those who have passed through your front door and who either have been interviewed, or have at least placed an application. A letter or an interview sheet should never be thrown away until months have passed—even if the applicant is next to impossible. Many employment managers have thrown away applications at first, but have learned the hard way. What happens too often is this: the applicant leaves your desk. You have sized him up as being that one who is "next to impossible" and drop the interview card or application blank into the wastebasket.

The pay-off starts building up to a climax when the applicant in great glee calls on some influential person and says he has applied for a job at the Personnel Department of the You-Fit-It Company. The patron, of course, knows your big boss, and while the applicant sits beside the desk, the patron dictates this letter:

"Dear 'J.F.':

My old school friend, Bob Inn, has just told me he has applied to your Personnel Department for a job. I have known Bob for 35 years, etc., etc., etc. Anything you can do for him will put me eternally in debt to you."

When the big boss gets the letter, his secretary sends down for the application or card, as the case may be. You, of course, do not have it and you have forgotten forever the man and his visit. You have to do a lot of stammering, side-stepping, side-slipping, and muttering to wriggle free of the situation.

This is probably not an entirely new experience for many in the personnel field.

A third source of employees is the contact with the usual employment agencies—both commercial and public. Certainly at one time or another, files of YMCAs, churches, Red Cross, American Legion, Social agencies, Chamber of Commerce, and all assortments of personnel organizations have been checked. Of course

FEMALE INDUSTRIAL WORKERS WILL BE IN DEMAND. EMPLOYMENT MANAGERS SHOULD PLAN ACCORDINGLY.



in an all-out war, the United States Employment Service, by law, will be an only source.

Though there has been no attempt to cover all the sources for employees, there are others which probably are less effective than those mentioned. After locating people comes the real problem of how to select.

How To Select

So many books have been written on this subject and there are so many experts, that this subject is broached with well-considered hesitation.

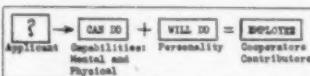
Regardless of the fact that we may soon be operating under a national emergency, the importance of the interview should not diminish. What is it we wish to accomplish in this interview? What are our objectives?

At Vicks our objective is a continuing one. We have what we call a 35-Year Plan. It's a plan for making Vicks an enduring enterprise by maintaining payrolls and dividends in future years. A basic finding of this plan is that we must always maintain an adequate supply of capital and manpower. We must always have on hand enough money and enough able people. Our most important job is the selection of people who can either create ideas or help put them to work—contributors and cooperators.

This is our prime objective in interviewing. And it will remain our objective in a forthcoming period of labor market instability.

We feel that by doing this job we are buying the best type of future insurance available to us.

Here is an equation we have adapted for our use:



There is nothing new in this equation itself. It's now used by many companies. The "Can Do" part of the equation includes the physical and mental capabilities necessary for the specific job. It's the objective information we can get through testing, reference checks, physical examinations, and the application blank.

Incidentally, we may be forced to take draft-aged applicants for temporary work; therefore, we should insure that our application blanks include military classifications and selective service numbers. If the applicant doesn't have this information, he should be urged to get it as soon as possible.

It is the "Can Do" side of the equation on which standards may have to be relaxed. Even if we have to take a man over 40 for a job that calls for a man aged 25 to 30, there are plenty of people over 40 today (thanks to the wonders of modern medicine) who still have the "Will Do" and much of the "Can Do."

Then it is the "Will Do" factor that will need the very closest scrutiny. It is this factor which can be determined through the interview alone. This is the applicant's personality or the unique things about him which make him behave as he does. Three chief aspects are:

(1) **Drive or Motivation**—Is the applicant seeking a job because he is motivated by a need for security or because he is motivated by a need for new experience or change? He won't be with you long if it's the latter. Is he motivated by the desire to belong to your organization where his friends are, or by the need for "just anything you've got, I've got to live."

(2) **Stability**—How deep are his "community roots?" How many different cities and geographical areas has he been in during the past five years? How seriously does he consider his family (if he has one)? Will such consideration restrict his mobility?

(3) **Maturity**—Not based on chronological age, but rather—is he standing on his own two feet? Is there an ability to face things and more important an absence of excuses? Is he "chasing rabbits" or planning for tomorrow?

For those applicants who show promise, the answers to these questions can be determined by a careful investigation of the individual's family, educational, and social background, his economic adjustment and his past work history.

If our work force is to be a static

one, we should have the right answers for these questions. We must have stable, productive, cooperative, and satisfied workers.

Tests

Just a word about testing. Although every personnel man alive dreams of the day when tests will solve all his selection problems, it's debatable that any will live to see it.

Realistically, then, tests and their value must be appraised in a period when a labor market is either restricted or very highly fluid—whichever you choose to call it.

Can you insure that you will always have capable test administrators and interpreters? If not, which tests can you eliminate without seriously jeopardizing your ability to determine "Can Do"?

Some of us test to a much greater extent than others. Those who do, undoubtedly, are using them with a criterion established on standards within their own organizations. Norms for the United States on an Otis I.Q. would mean little in China. Likewise, norms established on the Otis test for second hands in North Carolina mills would be meaningless for plant supervisors in a mill in Mississippi.

Despite all this background, we'll probably do just exactly what I heard a Personnel Director of a large firm say the other night—"We'll probably end up with one test—the touch test and if they're warm and breathing, they'll be on the payroll in a matter of seconds!"

The Challenge

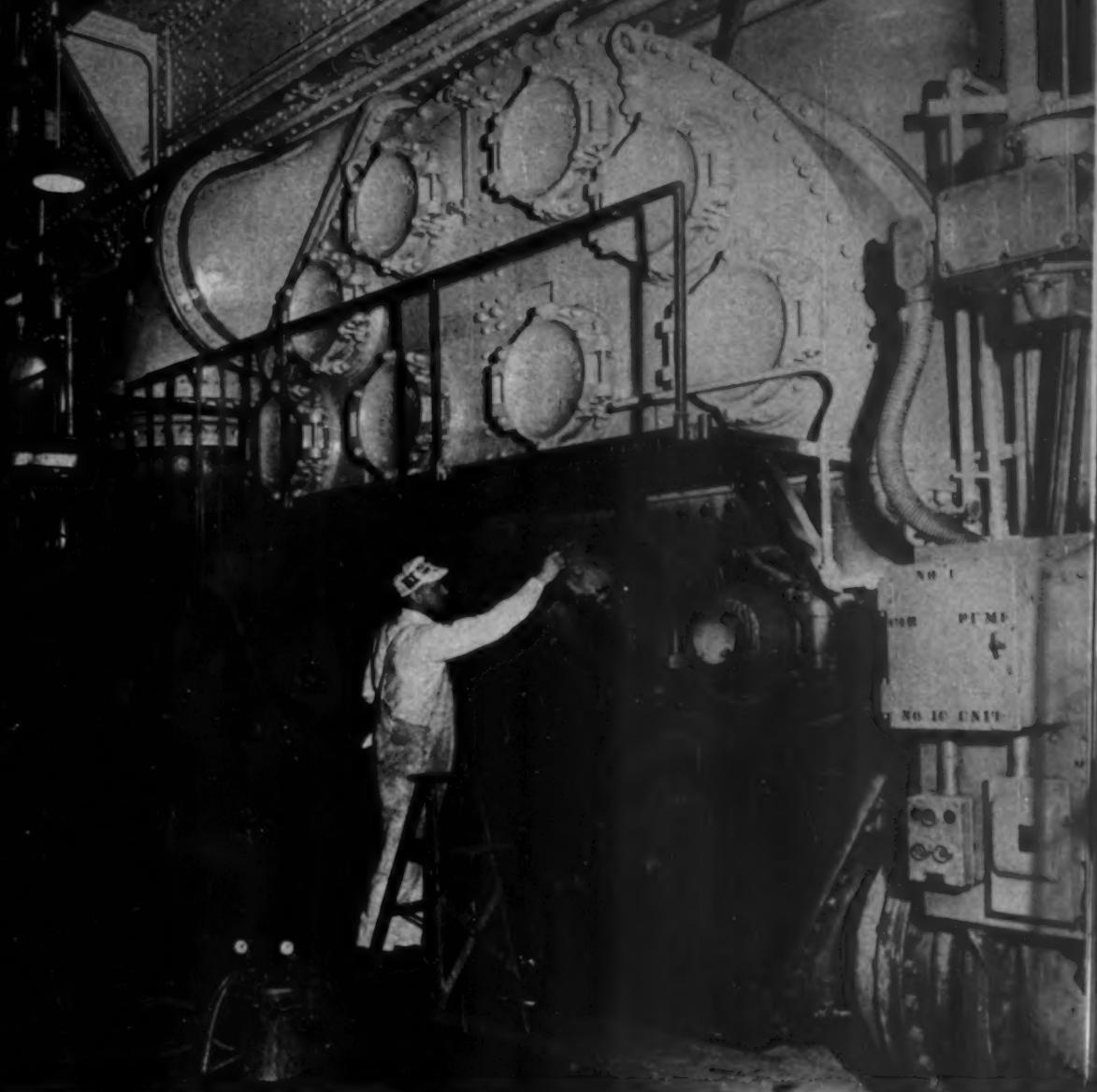
Seriously, these next several months will be a real "Challenge to resourcefulness." We must be resourceful in:

(1) Keeping an adequate working force intact despite a recognized drain caused by essential war industries as well as the draft.

(2) Locating or training "qualified" replacements.

(3) Adapting selection techniques necessitated by pressures of war-time economy.

(4) Maintaining or increasing our rate of productivity despite labor market instability.



HERE IS POSITIVE PROOF THAT PAINTING, AND PAINTING ALONE, MAKES A GREAT DIFFERENCE.

PAINTING AT PEPCO

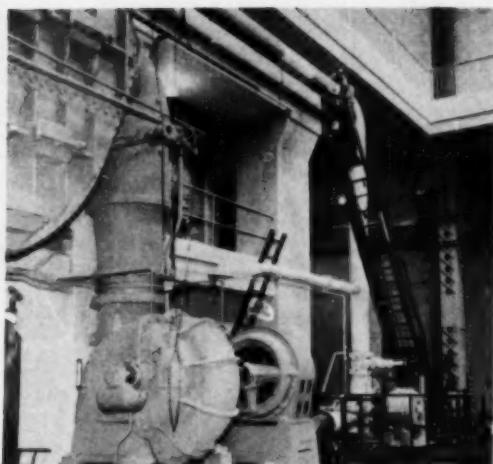
POTOMAC Electric Power Co., well known for the emphasis its employees place on clean equipment and working spaces, has

recently been giving particular attention to painting problems and painting procedures in several of its generating stations. The dra-

matic effect of the face-lifting in these plants is forcefully shown in the accompanying *BEFORE* and *AFTER* views which were fur-



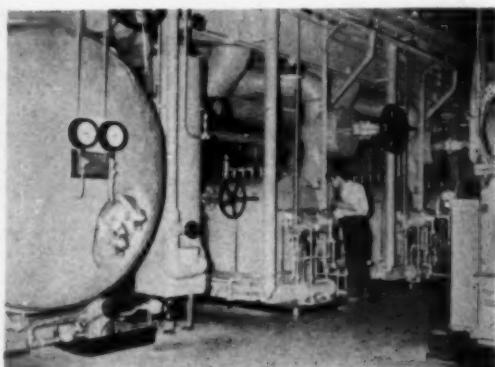
BEFORE: BUZZARD POINT UNIT, SHOWING CONDENSER DOOR AND CIRCULATING WATER PUMPS BEFORE PAINTING WAS DONE.



AFTER: SAME VIEW AFTER N. L. HUNT HAD PAINTED IT. LIGHTING AND PHOTOGRAPHY ARE IDENTICAL IN BOTH PHOTOGRAPHS.



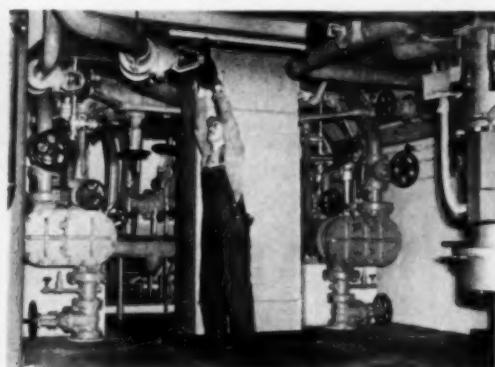
BEFORE: IN SEEMINGLY DIMLY-LIT AREA, P. T. CRAWFORD ATTENDS THE BOILER FEED PUMPS.



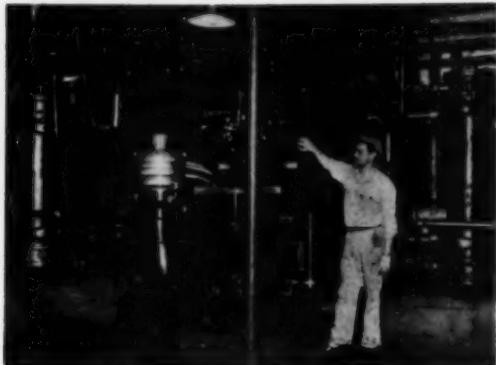
AFTER: SAME AREA AND SAME EQUIPMENT, EXCEPT IN THIS VIEW THE EQUIPMENT HAS BEEN PAINTED.



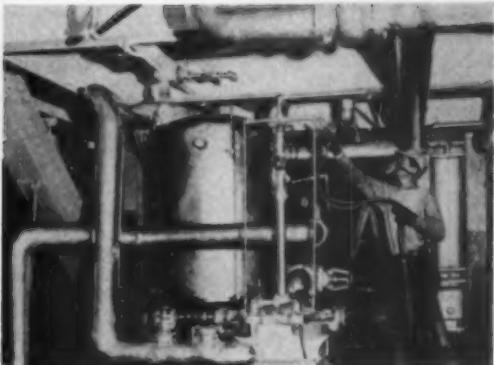
BEFORE: R. C. POWER OPENS THE RIVER WATER VALVE ON ONE OF THE UNITS. AREA APPEARS TO BE IN SEMI-DARKNESS.



AFTER: CAREFUL PAINTING LIGHTENS ENTIRE AREA, MAKES THE OPERATING PARTS STAND OUT. NO CHANGE BUT PAINTING.



BEFORE: AT OIL FILTER UNIT AT PLANT BENNING, HEAVY BLACK EQUIPMENT MAKES DARK WORKING AREA FOR R. E. SINGLETON.



AFTER: COMPARABLE AREA SHOWS GREAT CHANGE AFTER PAINTER E. W. WILLIFORD SPRAYS ON ALUMINUM PAINT.

nished by the editor of *PEP-CONIAN*, the company's employee magazine.

Using many of the ideas first put into practice locally at the Buzzard Point plant, the company painters have done wonders in changing the appearance of plant interiors.

The carefully selected color scheme initiated at the Buzzard Point plant, was also employed at the Benning Plant where painting was handled in a similar manner.

The ceiling is painted eggshell white, in a fairly hard smooth finish that tends to reject dust and yet reflect light without glare. Walls and girders are eggshell buff to simulate sunshine, improve the effective lighting, and harmonize with the buff colored brick. Turbines, generators, and related machinery and equipment are in "Benning Green", a specially prepared paint that contrasts nicely with buff and is easy on the eyes. The "Potomac Green" employed at Buzzard Point was made up especially to minimize the unsightly effect of fly ash—a constant problem in power plants.

Other machinery and equipment is painted according to a standard code. All hot tubing and pipes, for example, are painted with aluminum. Thus, aluminum signifies heat, and is a universal warning in the plant that the item so painted should not be touched with the bare hands. It also tends to withstand heat, and requires only one coat.

Safety Orange is used for valves

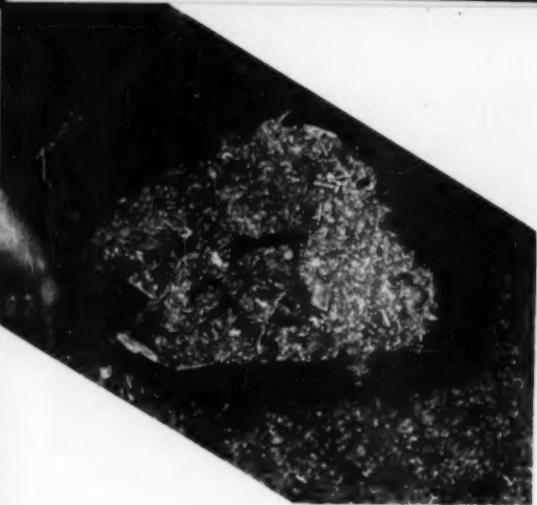


SPECIAL PAINT USED AT BUZZARD POINT PLANT TO KEEP EVER-PRESENT FLY ASH FROM SHOWING GREATLY IMPROVES PLANT APPEARANCE. GRIME ON J. R. FRANCIS' HAND CAME FROM ONE SWIPE OVER CLEAN-LOOKING PIPE.

and protruding parts. Signifying a greater degree of caution is Safety Yellow, which is used only on trip levers and other critical parts. Safety Blue, denoting thoughtfulness, goes on electrical switches. Safety Red which has lower visibility but greater attention value, is used on the sprinkler system.

Good paint is frequently thought of only as a protective coating, and as an element in improvement of appearance. But, there are many other possible advantages that should be given consideration in selecting colors and establishing

procedures. Among these, improvement of seeing through better lighting and contrasting colors is most important; and the added safety which comes from color codings and intelligent choice of contrasts is also of proven value. Finally, and perhaps most worthwhile of all, is the improvement in spirit of personnel that comes from an attractive, bright environment. Not only are the employees better satisfied and more alert, but clean well painted equipment and work spaces contribute greatly toward good plant housekeeping practices.



Salvage That Scrap

*It paid off nearly \$10
for every \$1 expended in
this Fort Worth plant.*

THE individual, who diligently practices conservation of his own goods, is not often nearly so interested in applying the same

CONTAINERS PROVIDE FOR MIXED METALS, FLOOR SWEEPINGS AND TRASH.



PROCESSING GROUP OF RECLAIMED PERISHABLE TOOLS (CLECO SHEET HOLDERS). CONTAINERS IMPROVE HOUSEKEEPING AND PLANT SAFETY.



measures to the material, equipment and supplies of the industrial plant that furnishes him employment. This apparent carelessness extends many times to supervision, who, under the pressure of production will allow wasteful habits to be formed. When individual waste is multiplied by that of many employees, the total of actual losses assumes a role of importance.

Recognizing the importance of materials conservation, top management of the Fort Worth Division of Consolidated Vultee Aircraft Corporation activated The Material Conservation Section. Departmental breakdown and primary functions of these divisions are outlined and typical operations from this highly successful materials conservation system are illustrated.

INSPECTION AND CLEARANCE OF REMNANT MATERIALS FOR FABRICATION.



Materials Conservation Section

Consolidated Vultee Aircraft Corporation
Fort Worth Division, Fort Worth, Texas

PREVENTION GROUP

Indoctrination of plant personnel with importance of preventing loss, waste, or damage to material, equipment and supplies.

Assists factory departments, inspection and management in locating wasteful practices, determining the cause and taking needed corrective action.

Furnishes a continuous policing service of all factory departments to insure continued compliance with existing regulations and procedures.

RECLAMATION GROUP

Receives all accumulations of scrap, obsolete and surplus, floor sweepings and mixed small parts for review and disposition.

Damaged assemblies containing outside purchased items, detail parts or hardware that is suitable for current production are recovered and returned to the Remnant Materials Store.

Items so damaged that they will not pass inspection are delivered to the Disposition Group.

REMNANT MATERIALS STORE

Receives from production, tooling and maintenance departments all usable cut-offs of sheet material, for stock, tubing, extrusions, etc. Receipts are processed, when necessary, by sawing or shearing to largest usable size, identified as to material, condition, diameter or gauge and stored in suitable bins.

Badly damaged materials and other waste cuts are sent to the Disposition Group.

DISPOSITION GROUP

Receives all accumulations of scrap, processing waste, turnings and borings, damaged items and other scrap articles after all parts, hardware and usable portions have been removed.

Accumulation is segregated into the proper material categories, weights of each determined and recorded and each material classification advertised for sale on a competitive bid basis.

Materials conservation results are particularly noticeable in the operations of the Remnant Materials Store. All production shop orders requiring material are initially cleared through this department, where bill of material lists, noting material size requirements for all parts produced are maintained. If material requirements are satisfied, production orders are

By W. B. Watkins

Material Conservation Supervisor
Consolidated Vultee Aircraft Corp.
Fort Worth, Texas

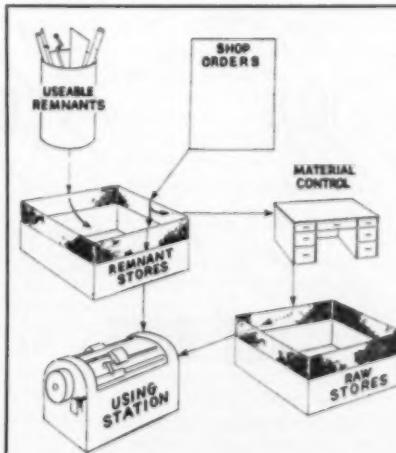
stamped FILLED FROM CUT OFFS, and routed to Raw Stock Stores for withdrawal of full size material.

Through the issue of usable rem-

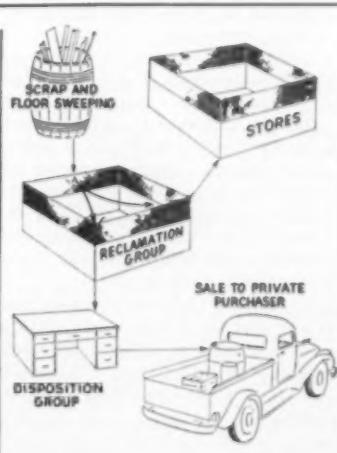
nant materials, the Remnant Materials Store is consistently able to meet the material requirements on 49 per cent of the production shop orders released for fabrication.

Floor sweepings (handled by Reclamation Group) that are known to contain values in bolts, nuts, washers, screws, small tools, etc., are processed through a primary sorting operation that re-

FLOW OF SHOP ORDERS AND REMNANT MATERIALS.



SCRAP AND FLOOR SWEEPINGS.



REMNANT MATERIALS STORE OFFERS A SERVICE TO PRODUCTION BY THE RECEIPT, STORAGE, AND ISSUE OF USABLE REMNANT MATERIALS AND IS CONSISTENTLY ABLE TO SATISFY ALL MATERIAL REQUIREMENTS ON 49 PER CENT OF PRODUCTION SHOP ORDERS RELEASED FOR FABRICATION. RECLAMATION GROUP SAVES THE CORPORATION OVER \$100 IN TANGIBLE RETURNS FOR EACH \$1 SPENT FOR LABOR AND OPERATING COSTS.

moves the dirt and other trash. They are then routed to tables for sorting, sizing, cleaning, identification, and inspection. Acceptable items are then returned to inventory stock through established receiving inspection procedures.

Waste paper is processed by shredding and baling and either used as a protective packing by the shipping department or sold. Used lumber, plywood, and wood boxes are received in the salvage lumber yard where they are processed to remove nails, damaged and irregular portions. Remaining portion is stacked in racks where it is available for use in plant construction or repair.

The Reclamation Group through its extensive salvage operations has compiled a record of saving the company over \$10 in tangible returns for each \$1 spent for labor

TYPE OF MATERIAL IN CONTAINER	
ALUMINUM	
<input type="checkbox"/> 24S	
<input type="checkbox"/> 75S	
<input type="checkbox"/> SECONDARY ALUMINUM	
<input type="checkbox"/> MIXED 25, 35, 145, 175, 525, 535, and other unclassified aluminum	
<input type="checkbox"/> PAINTED ALUMINUM	
STEEL	
<input type="checkbox"/> STAINLESS STEEL	
<input type="checkbox"/> OTHER STEEL	
<input checked="" type="checkbox"/> MAGNESIUM	
<input type="checkbox"/> OTHER	
INCLUDES, MICARTA, PLEXIGLASS, WIRE, KIRKITE, BRASS AND ALUM. SWEEPINGS	
Each material checked above is not contaminated with any other material	
ROUTE TO <input checked="" type="checkbox"/> REMNANT STORES (Usable remnant not less than 6" x 6")	
<input type="checkbox"/> REMNANT TOOLING	
From: DEPT NO. 31 COL. No. 12-C <i>H. W. Moore</i> SUPERVISOR	

HERE IS A TYPICAL SCRAP COLLECTION TAG USED TO ROUTE REMNANT MATERIALS AND SCRAP FROM PRODUCTION TO MATERIAL CONSERVATION GROUPS.

and other operating costs.

Key to the success of the conservation program at Consolidated is that it is an independent organi-

zation reporting directly to top management and has the weight of top management authority to reinforce all phases of the program.

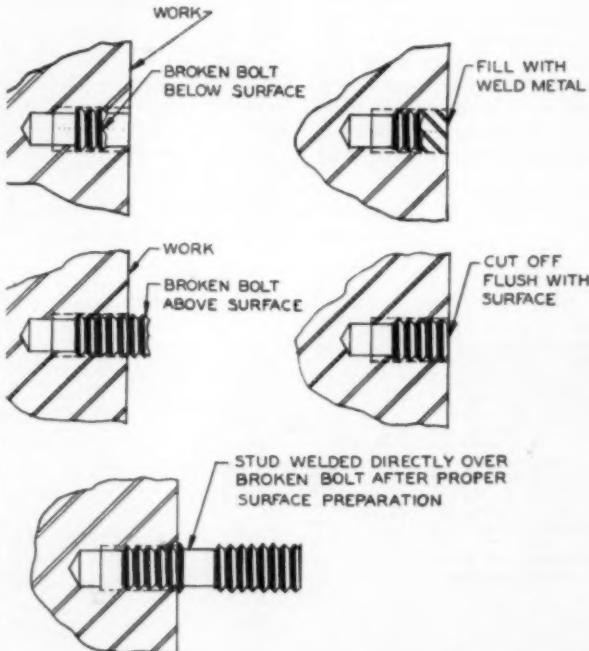
End Welded Studs Replace Broken Bolts

REPLACING broken bolts is the maintenance man's bugaboo. Whether the bolt breaks off above or below the surface, the broken portion must be removed, the hole retapped, and a new bolt inserted.

With the Nelson stud welding gun, however, it's a much simpler job. No drilling or tapping is required—the stud is simply end welded in place after minor surface preparation.

One manufacturer has cut his bolt replacement time from 20 minutes to 5 by this method. If a bolt breaks off above the surface, it is first cut off flush. The stud is then end welded directly over the imbedded portion of the original bolt. When the bolt breaks off below the surface, the hole is first filled with weld metal before the stud is end welded in position.

The weld joint is stronger than the metal. Considerable time is saved, and the lightweight, portable gun makes it easy to replace broken bolts regardless of their location.



Removing Fuel Oil Slag from Boiler and Superheater Tubes

Unusual procedures for boiler cleaning are always questionable until proven in practice. The editors will welcome additional field data.

FUEL oil is often considered the ideal fuel for the modern steam generator; however, this is not always the case for some fuel oils cause more trouble than low-fusion ash coal in slagging boiler and superheater surfaces.

Tenacious Slag

In some cases the Bunker C grade of fuel oil produces a slag-ash that adheres so tenaciously to boiler and superheater tubes that it is almost impossible to remove it by hand chipping. Air and steam lancing is of no avail in removing this type of slag.

Especially is slag difficult to remove in closely nested superheater elements, and in modern compactly designed steam generators.

This slag-ash not only increases the draft drop across a boiler and superheater but also increases the expense of removal and prolongs boiler outage hours beyond all reason.

Operators have been caught with a heavy inventory of this troublesome grade of fuel oil that had to be burned. Contracts, too, often force the use of the fuel for extended periods before relief can be realized, if at all, from slag formation.

High Rating

There have been noticeable cases where this slag-ash type fuel burned satisfactorily under a restricted circulation boiler, and under the modern steam generator the same fuel caused the building up of dense slag of a metallic nature that practically forced the steam generator out of service after only a short run in service at full rating.

Having had such an experience,

and after using the hand chipping method in an effort to remove the slag from a superheater that was completely masked with a metallic slag, but with little effect, we remembered having read an article in the dim dark past that dealt with a slag removing problem in Europe.

Aqua-Ammonia

This operator had the usual ash accumulation on the boiler tubes that was not readily removable by steam lance, so he introduced a mist or fog of aqua-ammonia into a closed and cool boiler setting and found this an easy and inexpensive method for cleaning the tubes.

There was, as we recall, no prescribed treatment as to gallons or pounds per cubic foot of furnace volume or square feet of boiler surface recommended in this article.

The theory was that even though the slag or ash resisted removal by chipping that there were enough strain cracks in the slagged coating to allow the aqua-ammonia to penetrate to the tube metal and travel along the tube surface and loosen the slag. Some of the slag would fall away from the tubes but large bridged over sections would have to be knocked off by mechanical means.

An Actual Test

In an actual try out in a steam generator, the above statement was proven.

By the cut and try method aqua-ammonia was introduced with an air type atomizer lance. First, the boiler was allowed to cool and chipping hammers were tried but progress was slow. The air atomizer lance was tried and thirty

**By
J. P. Warren**

gallons of aqua-ammonia was sprayed over all tubes and superheater elements with all openings in the boiler closed. The boiler was allowed to stand over night.

Results

The next morning considerable quantities of slag and ash had fallen to the furnace floor, but there remained much of the metallic-like slag that was bridged and massed between tubes. Hand hammering and pneumatic chipping hammers removed a great deal more. The inaccessibility of the most of the slag in the superheater was a problem, so a "rattling tool" adapted for use in a pneumatic hammer was made.

The tool was a suitable length of one inch pipe with one end shanked to fit a chipping hammer, and the other end held a U type shoe that conformed to the O.D. of the superheater elements. This tool was long enough to reach almost all of the superheater elements through the inspection openings on both sides of the boiler.

The operator would press the U shoe against the upper part of the superheater element and the rattling effect of the pneumatic hammer loosened the slag and caused the slag to fall to the floor below. Where three or more tubes were bridged solid by the slag the vibration broke up the slag bridges.

Savings

Approximately eight hours was required to "rattle down" and remove the slag from a boiler with about 25,000 cubic feet furnace volume. It also reduced the outage time, and did a job that would have been almost impossible with hand chipping only. No objectionable results were evidenced.

COOLING with HEAT

Absorption Refrigeration Machine Heats and Cools Houston Building

**200 ton unit, operating on 12-14 psig
steam, uses water and salt as a re-
frigerant - absorbent combination.**

THE Southwest, with its low cost fuel, is literally cooling with heat with numerous high temperature absorption refrigeration machines. A well engineered installation that is giving excellent service is the 200 ton Carrier unit in the United Gas Corporation building in Houston, Texas. Operating on 12-14 psig steam, machine uses water and salt as a refrigerant-absorbent combination. Steam is produced by burning natural gas in the boilers which are also used for winter heating service.

What Is Absorption Refrigeration?

Gas absorption, comfort air conditioning units have been on the

market for several years, but they have been of much smaller capacities (30 tons and under) than the 115, 150, and 200 ton units avail-

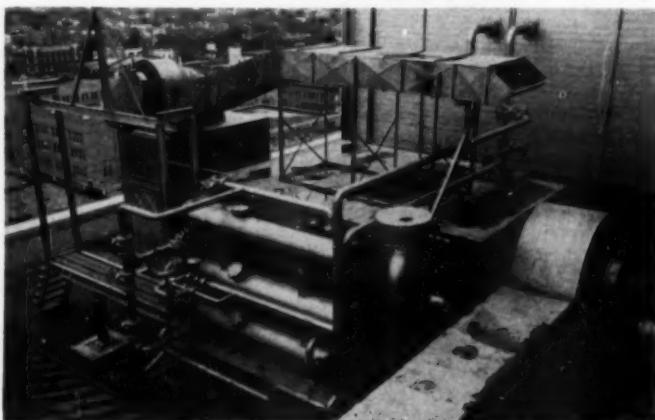
INSTALLATIONAL VIEW OF THE 200 TON CARRIER GAS ABSORPTION MACHINE AT THE UNITED GAS CORPORATION BUILDING IN HOUSTON, TEXAS.

The absorption refrigeration machine replaced five 27-ton units which previously furnished summer air conditioning for a portion of the building. While producing 200 tons of cooling effect, the new single unit occupies but one-half the area required by the five small units that gave only 135 tons in cooling equivalent.

able today. Prior to the introduction of the large tonnage units, the gas industry's only answer to air conditioning demands in the medium and high capacity range were the steam jet and turbine driven centrifugal machines.

Each of the machines had its own special field of application, and the need for a more economical heat-operated cooling machine in the larger capacities had been apparent for some time.

The steam jet, due to its comparatively high steam consumption rate at lower steam pressures, is limited to applications where low



HUMIDITY OF THE AIR IS CONTROLLED BY THE SURFACE COMBUSTION KATHABAR DEHUMIDIFYING EQUIPMENT, IN SERVICE ABOUT 10 YEARS, ON THE ROOF OF THE BUILDING. CAPACITY OF THIS EQUIPMENT IS EQUIVALENT TO APPROXIMATELY 50 TONS OF REFRIGERATION.

cost, high pressure steam and cheap water are available. Turbine driven compression machines are at some disadvantage because their steam consumption is excessive, except at comparatively high steam pressures, and their initial cost is higher.

The absorption refrigeration cycle is based on the physical fact that the vapor pressure of one substance (refrigerant) can be lowered by adding another substance (absorbent) which forms a solution with the first one. The greater the amount of absorbent added, the greater will be the lowering effect.

By using an absorbent with a sufficiently low vapor pressure of its own, and by maintaining the solution at proper concentration and temperature, the vapor pressure of the solution can be thus kept lower than that of the refrigerant in the evaporator. The solution, when sprayed in the absorber channel connected to the evaporator, will withdraw and absorb the refrigerant vapor, causing more refrigerant to evaporate, thereby cooling itself and its surroundings.

Application

Units are applicable in areas where steam can be produced at relatively moderate costs, where there are district steam plants, where natural gas is available, or where a factory or office building has a steam plant that is lying relatively idle in summer.

The unit will operate on either high or low-pressure steam, or even low-pressure waste steam. Aside from a small solution pump it has no moving parts, and therefore is practically noiseless and vibrationless.

It is lightweight and compact and is entirely suitable for installation on rooftops, basements or intermediate floors.

Houston Installation

The unit installed by United Gas in Houston, Texas, provides several definite advantages over former equipment, which was undersize because of added requirements and had become inadequate. The minimum of vibration and noise

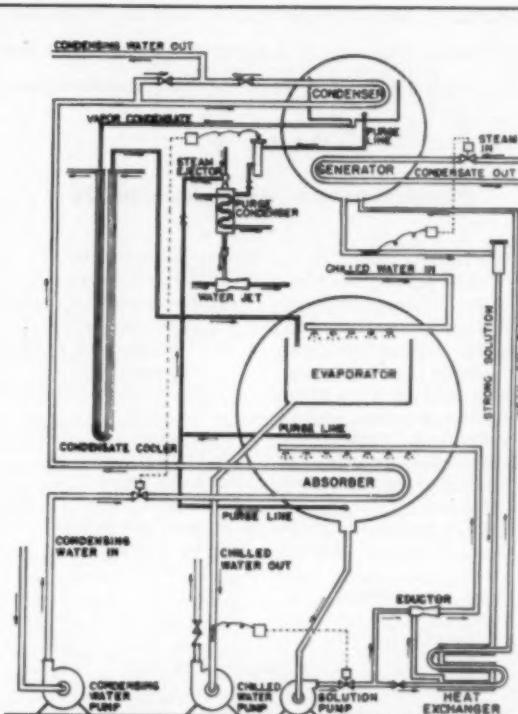
Adapted from the *UNITED GAS LOG*, a publication of the United Gas Corporation, Shreveport, Louisiana.

was important because the equipment had to be installed on the second floor of the building. Weight was another essential consideration. A reduction in operating cost and a boost in operating efficiency were the desired results and the new installation has provided both.

Placed in operation in June of 1949, the unit's performance during the past two summer seasons

has been satisfactory on the specific job it was designed to do.

Steam from the two low pressure boilers in the basement is used to provide both heat and cooling. In winter, steam heats the water that is circulated through the coils of the air conditioning system. In summer, it is used to produce chilled water to be circulated through the same set of coils, etc., for the desired cooling effect.



Flow Diagram

The Carrier absorption refrigeration unit installed at the United Gas Corporation office building in Houston, Texas, is made up principally of a condenser, heater, evaporator and absorber.

It produces a continuous supply of chilled water at 44 F. This 44 degree water flows into a water-to-water interchanger, where it in turn is used to cool a separate stream of water—the water that is actually circulated through the air conditioning system.

In other words, 44 F water comes out of the unit, goes into the interchanger, where it cools the secondary stream of water, and then goes back into the machine. This is the primary chilled water circuit.

Water in the secondary circuit enters the interchanger at about 57 F and is cooled down to 51 F by coming in contact with the 44 F water from the machine. This 51 F water then passes into the coils, and air is blown through the coils by large fans.

Leaving the coils at approximately 58 F, the air is blown through the circulation system, providing comfort air conditioning. From the coils the water goes back to the interchanger where it is again brought down to 51 F and is recirculated.

Maintenance

Anti - Friction Bearings

By E. P. Stahl The Garlock Packing Company

The application of anti-friction bearings to mechanisms presupposes proper maintenance to insure longest life. It would be impossible to cover specific maintenance problems in a paper of this kind, but there are simple basic rules, which if observed, will insure long, uninterrupted, bearing life.

PART I

Preparation and Assembly

HEAVIER bearing loads, higher speeds and higher temperatures in modern mechanisms has brought the matter of ball and roller bearing maintenance into bold focus. Aside from the proper selection of a bearing for a given application there are other factors such as preventive maintenance and operational maintenance that influence the operating life of ball and roller bearings.

In the field of preventive maintenance the following factors

should be considered:

- (a) Housing design
- (b) Preparation of housing and associated parts
- (c) Preparation of shaft and associated parts
- (d) Handling and installation of bearings
- (e) Sealing
- (f) Storage of bearings
- (g) Lubrication

Some factors effecting operational maintenance follow:

- (a) Lubrication

- (b) Cleaning and purging bearings
- (c) Removal of bearings and seals
- (d) Renewal and conditioning shafts and associated parts
- (e) Conditioning parts for corrosion resistance

The pattern of industrial operations today automatically introduces requirements for preventive maintenance of ball and roller bearing applications to gain maximum service efficiency from the bearings at minimum cost. Some problems relating to preventive maintenance are easily resolved while others present greater difficulties.

FIG. 1.

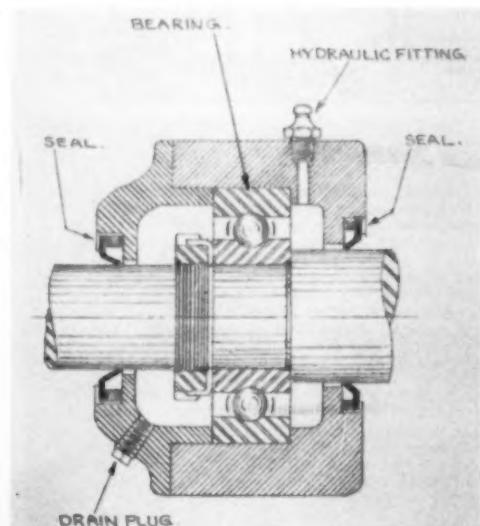
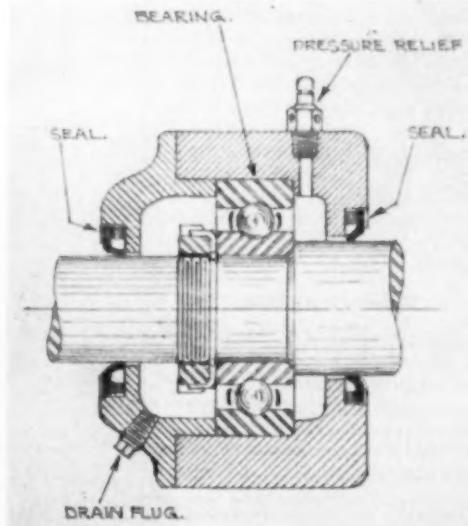


FIG. 2.



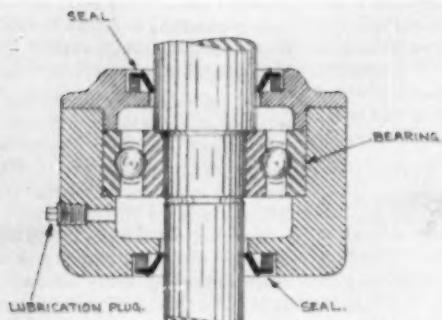


FIG. 3.

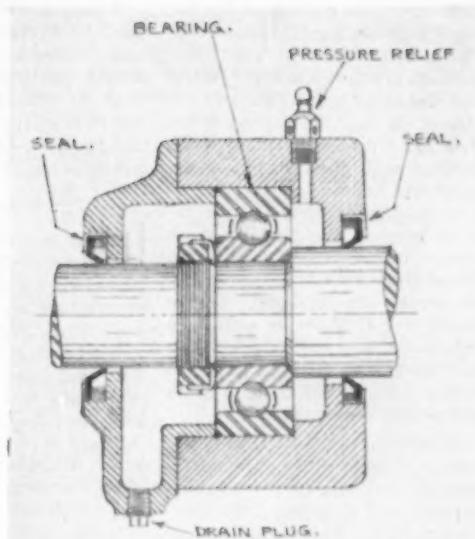


FIG. 4.

In the field of preventive maintenance bearing housing design plays an important role.

1. Housing equipped with tight fitting seals as illustrated in Fig. 1 will build up pressure and prevent grease entering into the bearing in sufficient quantity. The cure for this condition is to provide a vent in the bearing housing at some convenient position as covered by the commercial grease relief fittings as shown in Fig. 2. Many bearing failures are blamed on faulty lubrication when they are the fault of poor housing design or inefficient seals. Preventive maintenance of bearings should start on the drafting board.

2. Two bearings well spaced in a housing with only one grease fitting outside of a bearing are likely to be inadequately lubricated. Lubricating such an application is like blowing into a bottle. The answer to this problem is to supply a second grease fitting near the second bearing.

3. Lubrication difficulties also may develop in horizontal housing designs where the application points are on the same side of the housing. This is much like a housing without a vent and requires a grease soft enough to level off and reach the bearings.

4. In bearing housings poorly sealed the only solution is to develop adequate sealing by the application of more efficient seals such as unit type synthetic rubber or leather seals. Hard grease may be used as a temporary expedient.

5. In vertical housing designs with the application point well below the bearing as shown in Fig. 3 the bearing is likely to be inade-

quately lubricated. The solution is to move the application point or fill the housing completely.

6. In housing designs with grease channels too long and too small in diameter, a grease gun often builds up a stalling pressure but delivers no grease to the bearing. The answer to this problem is to increase the size of the grease channels.

A preferred design and one that has been used successfully by many ball bearing users for many years is shown in Fig. 4. It permits the

user to select the better greases and secure the advantage of long periods between greasing. It also makes all grease applied pass into and through the ball bearing. This design supplies the grease from a point closely adjacent to the face of the ball bearing on one side. The interior of the bearing housing is shaped to direct the grease into the bearing so that even the smallest amount reaches the points where it does the most good.

In addition to the proper housing design for ideal lubrication, it is

FIG. 5.

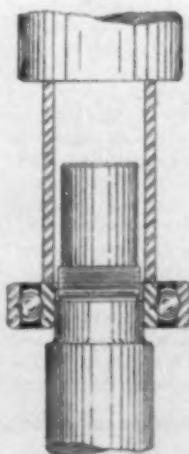
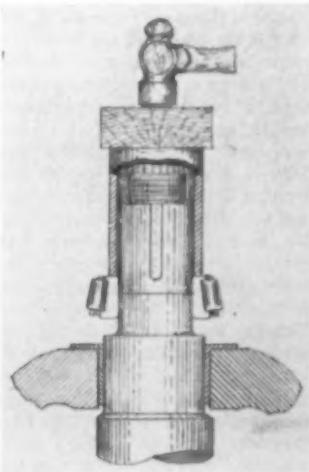


FIG. 6.



well to add a few words here regarding proper sealing. A few of the types of seals and closures commonly used with ball and roller bearings are shown in Fig. 7. Many ball and roller bearing failures are blamed on poor lubrication when they are entirely the fault of inefficient seals. Temperature, moisture, fast moving air, or any of several other conditions may remove lubricant, contaminate it, or change it due to inefficient seals. All of these conditions can be met by proper housing design and the incorporation of proper seals. The incorporation of leather or synthetic rubber unit type seals as shown in Fig. 4 has solved many perplexing sealing problems.

Where the engineer has given careful thought to the problem, lubrication becomes simpler to maintenance and shop men, the selection of the right grease is less complicated and the amount and time interval is easily established.

Even though suitable lubricants are selected for bearings and suitable methods for applying them are adopted, there is always a possibility of the bearing being starved for lubricant unless the housing surrounding the bearing is properly designed for effective lubrication and relubrication.

Preparation of Housing

To prevent the possibility of any housing material flaking off and getting into the bearings, the interior of cast housing should be coated with oil-resistant paint or enamel. Housing should be inspected to see that oil holes and vents are in the proper location and are open. Where housings are made of softer alloys, steel inserts should be applied to hold the bearings and prevent peening and looseness, particularly when the bearing is subjected to heavy load and vibration. Housing seats should be ground, precision-bored, or reamed, and should conform to the recommended housing diameters given by the bearing suppliers. Housing shoulders should be square, with corners broken to avoid burns and nicks. Wherever possible it is advisable to machine the housings at one setting. Furthermore, they can be more easily machined and checked if they are

thru-bored.

Where bearing end covers are used with bearing housings, the seal recesses and rabbet shoulders should be machined concentric with the bearing housing bore and the faces of the bearing end cover flange and rabbet should be truly square with their axis.

Preparation of Shafts

Shafts should be large enough in diameter to resist undue deflection, particularly where cylindrical roller bearings are used. Shaft bearing seats should be smoothly ground and should be free from taper and out-of-roundness. Hand-work on shafts, such as filing and polishing, should be avoided as this is likely to cause unroundness and other inaccuracies. Recommended shaft diameters furnished by bearing suppliers for the average application should be followed. Shaft fillets should be smooth and within the dimensions specified in the bearing tables furnished by the bearing suppliers in order that there will be no interference with the bearing corners. If undercutting is used, there should be no sharp corners to possibly cause shaft breakage in service. Shaft shoulders should not be smaller than specified by the bearing suppliers. They should be square—preferably ground—and should be free from nicks and burrs.

All mounting parts with bearing shafts should be accurately machined or ground. Shaft spacers should be a light push fit on the shaft and should have sufficient wall thickness to avoid buckling when clamped endwise. Their ends should be square with their axis. Shaft threads should likewise be square with the shaft axis and locknut threads square with the nut face in order to avoid bending the shaft when the nut is tightened. Where standard lock washers are used, care should be taken in bending over the tongs so that the tool used does not strike the bearing, shield or cage, also that the lock-washer does not bulge inwardly to foul the bearing cage, and that no chips are broken off the washer to possibly enter the bearing.

Handling and Assembly

Dirt is definitely bearing enemy

number one. For this reason repairmen should take every precaution in handling bearings to insure that no dirt or foreign matter is allowed to get into them.

Maintenance men must bear in mind that practically all dirt or dust causes wear. It is forever trying to get into ball and roller bearings and machines to shorten their life and destroy their accuracy.

But it is not always the obvious kind of dirt that may cause the most harm. In every factory or mill, even though clean to the eye, there is dust present. It is very often the insidious kind, nearly invisible. This dust settles in lubricants, exposed machine parts and bearings, if they are not thoroughly protected.

During assembly operations, bearings especially may be exposed to contamination by dirt and if this does occur their service-life is certain to be materially shorter than if dirt had been kept out. Whether in the storeroom, on the assembly bench or floor or in the machine itself, every precaution should be taken to protect ball and roller bearings from dirt. Such protection will pay big dividends in the long run. All parts of the bearing assembly, including shafts, housings, spacers, locknuts etc. should be thoroughly clean. This also applies to assembly tools, assembly benches and lubricating fittings. Bearings as received should be stored in a dry cool location and arrangements made to use the older bearings first.

Protection

After mounting, if bearings are to be left exposed they should be masked—covered with a clean cloth or paper. Normally it is not necessary to remove the protective coating on the bearings as received, since this material has considerable lubricating value. However, if the bearings are to be used at extremely low temperatures, it may be desirable to remove the protective coating and add an extreme low temperature lubricant.

Installation

Shafts should be cleaned of all dirt and chips before assembling bearings on them. The shaft should then be oiled so that the inner

bearing ring may be mounted more readily; care should be taken to see that the bearing is started squarely on the shaft to avoid any possibility of scoring the shaft seat. In ball bearing applications, pressure should always be exerted against the inner ring—**never against the outer ring**. This is extremely important as the balls may indent the raceways causing premature failure of the bearings.

If an arbor press is used to install the bearing as indicated in Fig. 5 a length of relatively soft steel tubing, preferably fitting rather closely around the shaft, should be used. The shaft should be supported as near to the bearing as possible, and in case of long, small diameter shafts, care should be taken to avoid springing the shaft during the press-fitting operation. If an occasional single bearing is to be applied, and an arbor press is not available, the inner bearing ring may be tapped into position on the shaft using a short length of tubing and a hammer as shown in Fig. 6.

Large sized bearings are sometimes given a shrink fit on the shaft. When this is done the bearing should first be heated in an oil bath not exceeding a temperature of 250 F, a screen or rack being used to prevent the bearing from contacting the bottom of the oil container. When a large quantity of large bearings are to be applied, infra-red lamps and reflectors may also be used for heating them. After the bearings have reached the proper temperature, the inner ring should be slipped over the shaft and held against the shaft shoulder until cooled. When the bearing has been firmly seated on the shaft, it should be checked to see if it rotates freely and has the proper internal clearance.

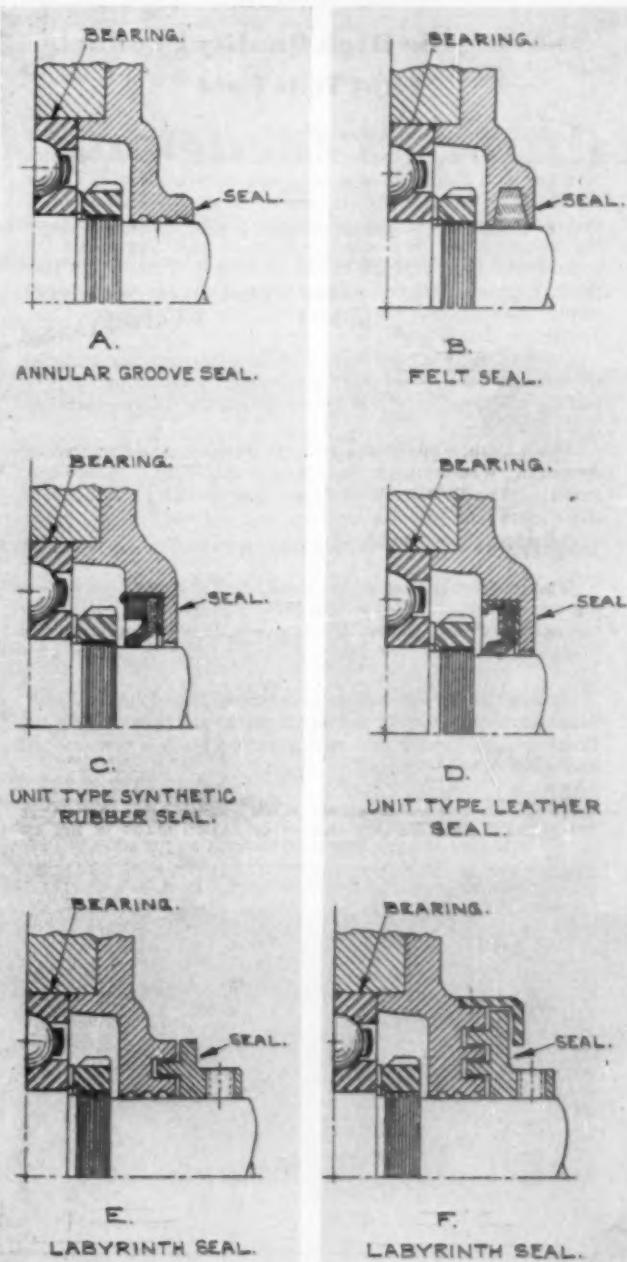
In assembling ball bearings into their housings, care should be taken to start the bearing squarely in the housing bore. Excessive pressure should not be exerted on the bearing at any time, as this may cause the balls to indent the raceways, with resultant noisy operation of the bearing. Where ball bearings are mounted in an "opposed" set up, it is important that the final assembly be checked to insure that there is a free axial movement of

the shaft sufficient to avoid cramping the bearings endwise when the maximum operating temperature is reached.

In mounting separable, cylindrical roller bearings, the outer ring

should be mounted separately with a light interference fit in the housing. However, the inner and outer members should be kept in good alignment during assembly, as otherwise the rollers may score the

FIG. 7. BEARING SEALS.



cylindrical raceways.

Sealing

It is estimated that 90% or more of ball and roller bearing failures are due to worn raceways resulting from foreign matter entering the

bearing and mixing with the lubricant in the bearing to form an abrasive compound. Many different forms of seals or protective devices are available to the design engineer to keep dirt out of ball and roller bearings. A few of these are illus-

trated in Fig. 7. Depending upon the type of conditions under which the bearings are to operate, these seals vary from simple grease grooves shown in design A to rather elaborate closures such as the double labyrinth shown in design F.

Design A shows a simple annular groove type closure. These are commonly used with ball and roller bearings and have proved very effective. Design B shows a bearing end plate grooved to accommodate a felt ring. Even though the felt seal is perhaps the most common, its sphere of application is limited. Felt seals are recommended for use with lubricants of medium to soft consistencies, average conditions of cleanliness, and medium speeds. Design C shows a unit type commercial synthetic rubber seal now widely used with ball and roller bearings. Design D shows a unit type commercial leather seal also widely used with ball and roller bearings.

Designs E and F show labyrinth closures mounted in combination with annular groove type closures. Combinations of the above described seals should be used where conditions are such that no one type can operate efficiently.

Storage

Bearings as received should be stored in a dry, cool location, preferably in a steel bin in the store room, or a bearing cabinet or cupboard on the assembly floor and arrangements made to use the older bearings in stock before the more recent shipments. Bearings should be kept in their original containers or cartons until used. If it is necessary to return unused bearings to stock after unwrapping, they should be rewrapped in the same or similar wrapping material and stored carefully. Make sure bearings are never wrapped in absorbent paper, as this will tend to absorb the protective coating from the bearing and allow it to rust.

Part 2, in a coming issue, will discuss cleaning, purging and lubrication of bearings that have been in service, and Part 3, to appear later will deal with procedures to be followed in removing bearings from service and their re-installation.

Saving the High Quality Product That Was Lost

CABOT Carbon Co. removed the cloud hanging over their plant in Pampa, Texas. The cloud which could be seen for 50 miles on a clear day, was composed of carbon black. This is the material Cabot Carbon produces. Carbon black is formed by burnishing natural gas and striking the flame against a moving metal surface. The soot-like material that remains on the metal is the final product, but unfortunately it doesn't all stay there; large quantities of carbon went up the smoke stack and formed the black clouds in the sky.

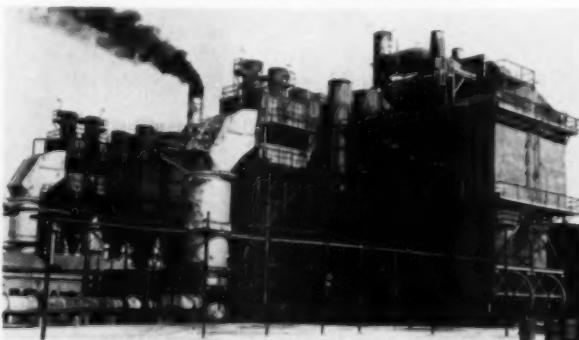
Until recently all attempts to collect this escaping material were foiled because the high temperature—averaging 350 F—and the acidic nature of the gas, destroyed the filtering medium.

Cabot Carbon installed a Dustube collector manufactured by American Wheelabrator and Equipment Corp., Mishawaka, Indiana. The Dustube is equipped with special synthetic cloth filter tubes that can withstand the heat and acids present in the manufacture of carbon black.

The Dustube eliminated the black cloud that had been hovering over that part of Texas. The cloud was a source of irritation not only to Cabot Carbon, but to everyone within miles of the plant.

In addition to eliminating a nuisance, they found an additional advantage, for the carbon black that had been lost was the finest quality. This highest quality carbon black is now trapped and sold by Cabot at top prices.

CONTRAST THE AMOUNT OF CARBON BLACK POURING FROM ONE OF THE STACKS WITH THE COMPLETE ABSENCE OF CARBON BLACK IN THE AIR STREAM ABOVE THE DUSTUBE COLLECTOR ON THE RIGHT.





GENERAL VIEW OF EXHIBITS AT THE 1950 INDUSTRIAL EXPOSITION IN HOUSTON, TEXAS.

International Industrial Exposition

Power and industrial equipment for all general industrial, power and large service plants to be featured at the International Industrial Exposition, Coliseum, Houston, Texas, March 11-17, 1951.

ADVANCED designs of tools, machinery and materials for industrial operation will be on display at the INTERNATIONAL INDUSTRIAL EXPOSITION to be held in HOUSTON, TEXAS, from

March 11 to 17, 1951, under the management of Ed G. Lenzner, 41 San Jacinto St., Houston 2, Texas.

Equipment for all branches of industry will be shown and will in-

clude the chemical, petroleum and steel industries, industrial and power plants, mills and shops of all kinds and sizes, and services that facilitate field and plant operation.

Officers and Executive Committee — International Industrial Exposition

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M. E. Walter
Houston Chronicle

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Gulf Tractor & Equipment Co.

Ed. G. Lenzner
General Manager

J. Stewart Rhoades
Assistant Manager

EXHIBITS FEATURE EQUIPMENT OF PRIME INTEREST TO PLANT ENGINEERING PERSONNEL.



Instrumentation for the Plant Engineer

Measurement and Control of

By E. A. Murphy

Brown Instruments Division, Minneapolis-Honeywell Regulator Co.

ALTHOUGH the thermocouple, which was discussed in Part II, is undoubtedly the most widely used type of electrical temperature sensing element, there are several others in general use throughout industry. Unlike the thermocouple, which is to a certain extent the work horse in the field of electrical temperature measurement, each of these other elements is intended primarily to handle a specific type of temperature measuring problem where the use of a thermocouple would not be practical. There are, of course, many borderline applications where the user may elect any one of several primary elements including thermocouples. In such cases, final selection is usually based on initial cost, useful life of measuring element, personal preference of the user or a combination of the three.

Resistance Thermometer Bulbs

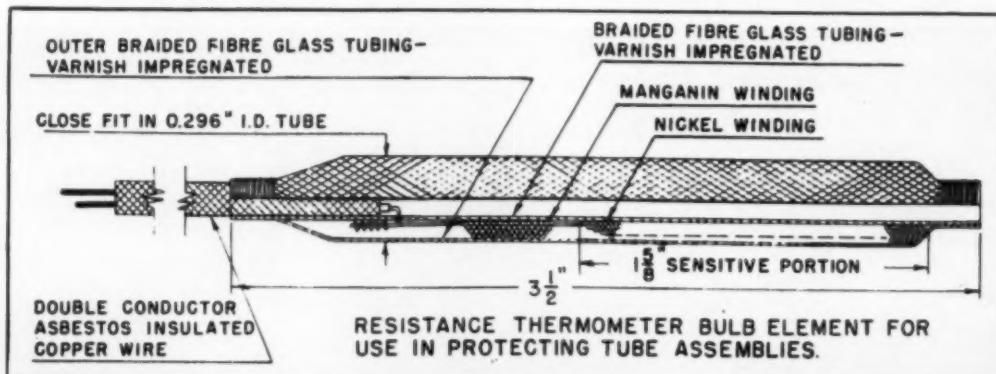
This element, as its name implies, bases its operation on the

SP&I is presenting this series on instrumentation to help plant and production engineers work out their process control problems. Rather basic in nature, the articles deal with variables commonly encountered in the plant and outline the principal means available for measurement and control.

fact that the electrical resistance of a conductor changes with temperature. In other words, if a section or coil of wire carrying an electric current is exposed to an increase in temperature, the amount of current which will pass through the wire will decrease as the temperature increases. This change in the resistance of a wire caused by a rise or fall in temperature varies with the type of metal used in the wire. The proportional change in resistance caused by a unit change in temperature is called the temperature coefficient of the metal and is the amount (in ohms) that the resistance increases per ohm for each degree rise in temperature.

Basically, a resistance thermometer bulb consists of a small coil of fine wire wound on a form of some material such as varnish impregnated fibre glass woven tubing. A metal such as nickel or platinum with a high temperature coefficient is used for the wire in order that small temperature changes will cause measurable changes in resistance. In some cases, nickel wire forms only a portion of the winding, the upper portion, or part away from the sensitive tip, being of manganin or some other metal. This reduces the cost of the bulb and gives it a high over-all resistance resulting in increased stability. Resistance bulbs are sometimes used unprotected, but

CROSS SECTION OF RESISTANCE THERMOMETER ELEMENT SHOWING METHOD OF CONSTRUCTION.



Process Variables - Part 3

Sensing Elements

Part 1 in the September issue of SP&I considered pressure type thermometers, and Part 2 in November discussed thermocouples. This part 3 deals with electrical temperature sensing elements other than thermocouples, and discusses their application in industry.

are more often mounted in protective wells.

Instrument Measures Resistance of Bulb

As the temperature to which the sensitive tip of the bulb is exposed changes, the resistance likewise changes. Since a small emf is applied constantly to the bulb through the instrument measuring circuit, these changes in resistance are measured and indicated or recorded by the instrument which is calibrated directly in terms of temperature. Inasmuch as the instrument measures **only** changes in the resistance of the bulb, ordinary copper wire is satisfactory for connecting the bulb to the instrument.

Advantages and Limitations of Resistance Thermometer Bulbs

The greatest advantage of this temperature sensing element is its accuracy and sensitivity when

used to measure very small temperature spans. Spans of 0 to 25 F are not uncommon, and there are in operation instruments having a differential of only 10 F between their minimum and maximum readings. This is possible because an outside source of emf (usually a battery in the instrument) is applied to the bulb as opposed to the thermocouple which must generate its own emf.

Resistance bulbs, like thermocouples, are separate from the measuring circuit and are, therefore, quickly and easily replaced.

Since plain copper wire is used to connect the bulb to the instrument, it is not necessary to stock any special type of wire such as thermocouple extension wire, nor is there any risk of untrained personnel using the wrong kind of wire or connecting it incorrectly as is the case where thermocouples are used.

Chief limitations are: the initial

cost of the element, which is considerably greater than that of a thermocouple, its inability to handle temperatures in the higher brackets, and the fact that under certain conditions, it tends to drift out of calibration, i.e. fails to give exactly the same resistance when repeatedly exposed to the same temperature. Although special bulbs are available for temperatures in the neighborhood of 1200 F (and one manufacturer claims 2500 F as the upper limit) it is usually economically advisable to limit the use of resistance thermometer bulbs to temperatures below 600 F.

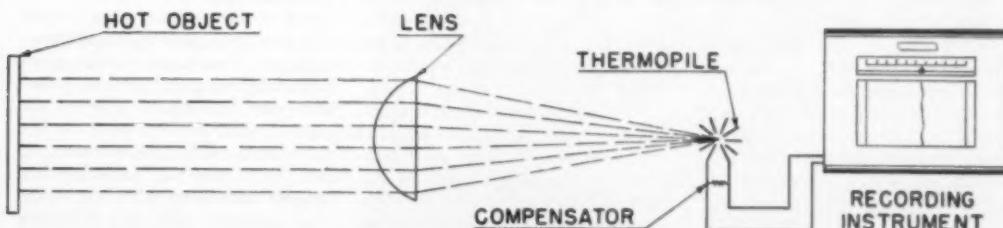
Radiation Units

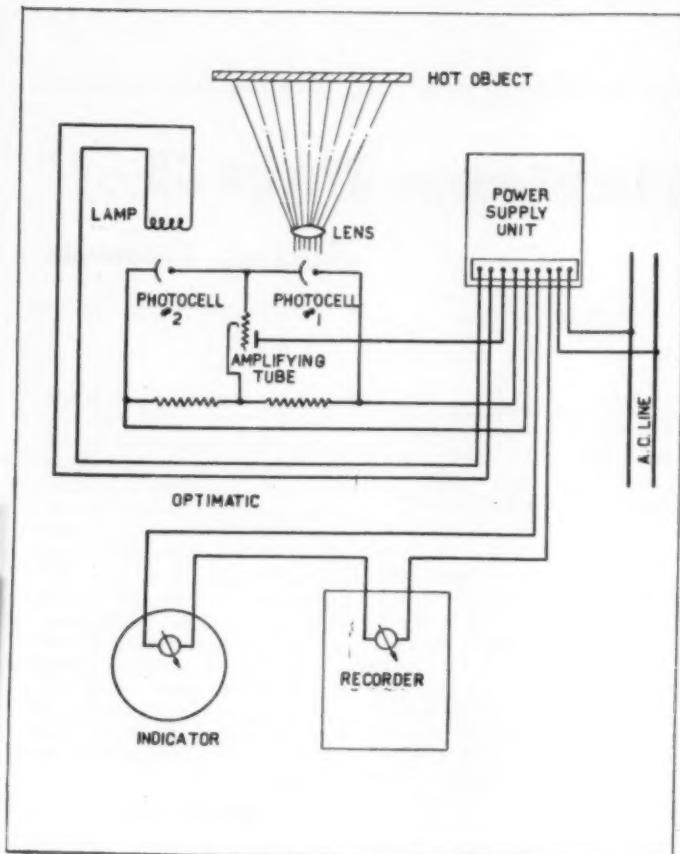
Designed originally for the measurement of extremely high temperatures, radiation sensing elements have been perfected to the stage where they can handle temperatures from 100 F to 7000 F.

The operation of this element is based on the fact that a body, when heated, emits radiant energy, the amount of energy emitted bearing a mathematical relationship to the temperature of the body.

Included in the sensing element are: a thermopile (i.e., a radial as-

SCHEMATIC DIAGRAM ILLUSTRATING PRINCIPLE OF RADIATION PYROMETRY.





SCHEMATIC DIAGRAM OF AUTOMATIC OPTICAL PYROMETER.

sembly of minute thermocouples (wired in series), a lens which focuses the radiant energy on the hot junctions of the thermocouples, some means of compensating for ambient temperature changes, and a tubular metal case which houses these components. A sighting window or lens in the back of this case enables an operator to sight the unit on the body or area whose temperature is to be measured.

The radiant energy from the heated body is focused on the thermopile which generates an emf proportional to the amount of energy received. As in the case of a conventional thermocouple, this emf is transmitted to an indicating or recording instrument. The radiation sensing element is connected to the instrument by means of copper wire.

There are several ways of in-

stalling the element. It can be sighted directly on the heated body through a small hole in a furnace or oven. When measuring the temperatures of furnaces, molten baths, etc., it can be equipped with a closed end metal or ceramic sighting tube. This tube is inserted into the atmosphere or fluid whose temperature is to be measured, and quickly assumes the same temperature as the measured medium. The radiation sensing element, mounted outside the furnace or other piece of process equipment, sights down this tube and measures the radiant energy emitted by the inside of the closed end.

When these sensing elements are mounted where they are subjected to exceptionally high temperatures, i.e., on furnace roofs or adjacent to the firing end of kilns, they are usually provided with air

or water-cooled fittings to hold their temperature below about 250 F.

Advantages and Limitations of Radiation Sensing Elements

These elements provide many advantages and are invaluable when an application involves temperature measurement of a moving body to which it would be impractical to attach a thermocouple. This is true, of course, because they need only look at, rather than feel, the object whose temperature they are measuring. Typical examples are: ware temperature measurement in the case of continuous enameling ovens (high temperature), and measurement of cloth temperature in certain textile processes (low temperature).

Since the element is located **outside** the high temperature zone, its life is far greater than that of a thermocouple, which must of necessity be immersed directly in this zone. For the same reason, this element is capable of measuring extremely high temperatures (7000 F) where thermocouples would be impractical.

When used with a metal or ceramic sighting tube, the element affords a means of measuring the temperature of highly corrosive gases such as sulfur dioxide from a sulfur burner. Since a relatively inexpensive sighting tube is the only part of the sensing element exposed to the hot gas, this is the only part which has to be replaced from time to time.

Initial cost is sometimes presented as a limitation of the radiation sensing element. This is not altogether true, especially in the measurement of high temperatures requiring the use of noble metal (platinum) thermocouples. Initial cost of a radiation element with necessary fittings for such an application may run as much as 60 per cent more than that of a noble metal couple also with necessary fittings. Two other factors must be considered however. The extension wire needed to connect the noble metal thermocouple to the instrument costs approximately 40 per cent more per foot than the copper wire used with the radiation element. But the fact that

one radiation element will have a far greater life than one thermocouple tends to offset difference in initial cost.

Dust or smoke passing between the lens of the radiation element and the object whose temperature is being measured will reduce the amount of radiation received and will, therefore, cause erratic temperature readings. This factor should be considered when planning the location of the element. Ordinarily, this is of importance only when the instrument used with the element is an automatic controller.

For satisfactory results, it is important that the radiation element be used only where the emissivity (ability to emit radiation) of the object being measured is constant. There are some materials, such as highly polished aluminum, whose emissivity varies greatly with temperature.

Optical Pyrometers

This temperature sensing element bases its operation on the fact that metals, when heated, undergo changes in color, i.e., give off increasing amounts of light. Basically, an optical pyrometer is a foot candle meter calibrated in terms of temperature. This calibration is possible because the brilliancy or intensity of light given off by a hot body, is directly dependent upon the temperature of that body. Since no appreciable change in the color of a heated body takes place in the lower temperature ranges, use of this type measuring element is limited to the higher temperature ranges, roughly 850 to 3000 F.

There are two general types of optical pyrometers—the small, portable, manually operated model, and the larger wholly automatic model. In the former, the operator sights simultaneously both on the hot object and on a small lamp or filament. A graduated knob or dial permits the operator to increase the amount of electric current flowing through this filament until the filament color or brilliance exactly matches that of the heated object under observation. The graduated scale indicates the observed temperature.

Although this manually operated device finds wide use throughout the metals industry for measuring temperatures of molten baths, ingots, and rolled strips, it has several disadvantages. In the first place, it is only as accurate as the individual who uses it. Even in the hands of a skilled operator, it is possible for the optical pyrometer to read incorrectly since the degree of accuracy achieved is a direct function of the eyesight and physical condition of the operator. Secondly, the device is an indicator and provides no means for obtaining a permanent record. The main advantages are: relatively low cost, and a high degree of portability.

Automatic Optical Pyrometer

As its name implies, this device performs automatically, the same functions as the manually operated pyrometer previously described. Light from the object being measured is focused on a photoelectric cell known as a viewing cell. The amount of electric current which this cell will pass depends upon the amount or intensity of light focused upon it. As the temperature of the hot object increases, its brilliancy also increases. This increase in the intensity of the light reaching the photoelectric cell causes a larger current to flow through the cell.

A second photocell in the unit

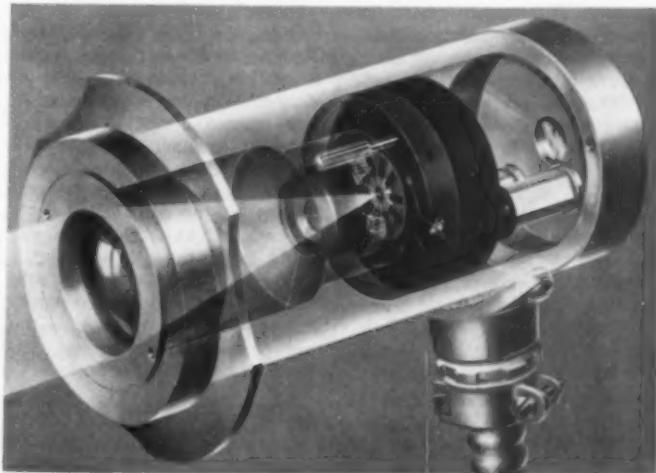
provides stability and eliminates errors which could result from voltage fluctuations or from variations in the characteristics of the photocells which can normally be expected after continued use. This cell, known as a balancing cell, is exposed only to light from a carbon filament lamp which, in turn, receives an amount of current proportional to the amount of light received by the viewing cell. This is accomplished by causing the current from the viewing cell to alter the plate circuit of an amplifying tube which controls current flow to the lamp. Thus the balancing cell is automatically brought into equilibrium with the viewing cell. The balancing lamp current is measured by an indicating or recording instrument calibrated in terms of temperature units.

Advantages and Limitations of Optical Pyrometers

Chief advantages of the manually operated optical pyrometer are: relatively low initial cost, light weight, simplicity of operation, and portability. Limitations, as mentioned previously, are: everpresent possibility of human error, and inability to produce a record.

The automatic optical pyrometer has as advantages: very high speed of response (approximately three-fifths of a second for full scale pen or pointer travel), no need for manual balancing, and can pro-

PHANTOM VIEW OF RADIATION SENSING ELEMENT ILLUSTRATING MANNER IN WHICH LENS AT LEFT FOCUSES RADIATION ON HOT JUNCTIONS OF THERMOCOUPLES.



vide a permanent temperature record.

This device was developed for highly specialized applications—it is primarily intended for use in rolling mills where all temperature variations in a rapidly moving object must be quickly indicated or recorded. It is one of the fastest means available for the

temperature measurement of moving or stationary bodies. Because its field of application is very specialized, this system is the "Cadillac" of temperature measuring systems. Its initial cost is roughly three times that of a system utilizing a radiation sensing element. This, in itself, is a serious limitation when considering its use on an

application which could be handled by any of the other sensing elements previously discussed.

Because of the failure of metals to exhibit measurable changes in color in the lower temperature ranges, the optical pyrometer can be used only for the measurement of temperatures above approximately 850 F.

Solving Compressor Intake Problem

Cool flow of air to compressor intake pays good dividends in this Houston, Texas, plant.

SPECIFICATIONS for a Texas branch plant of a Midwestern manufacturing company called for, among other details, locating the intake for the plant air compressor in one corner of the boiler room. Even though the fuel to be burned under the boilers was natural gas, the location brought an objection from a consulting engineer when he was asked to check the plans preparatory to actual installation of the equipment.

In the South, humidities run high, especially along the Gulf Coast, and where the average for the Middle West is about 70%, in Houston (the projected plant site) the yearly average is 86.5%. On the basis of the average temperature of 70 F, the relative humidity in each cu ft of free air contains approximately 6.90 grains of moisture, or almost exactly 1/1000 (0.001) pound of water in vapor form. Since the saturation point of air at 50 F is only 4.076 grains, by cooling the air toward that point almost 3/7 of the water borne by the air will condense and drop out—where it cannot trouble operation later in traps, separators and—eventually—air brushes and other using equipment. Thus, during the cooler months, an outside intake will automatically lower the dew point of the incoming air.

Now, going the other way on the thermometric scale, if the intake air be raised 20 degrees over the outside air (at 50 F) the saturation

point becomes 14.790 grains per cu ft. That is, the 20 degree rise has doubled the moisture-carrying capacity of the air. It will now take up any waste vapors, spent steam or other moisture which may be present. This absorption will double the task of separators, traps and other equipment needed to dry the air to the point where its entrained moisture will not damage tools or finished work.

Even if a duct be required to bring in air from a favorable spot outside the plant, this gain can run up to as high as 75 per cent of the moisture removal as against air which is warmed before being drawn into the compressor.

There is a second and not inconsiderable gain accomplished when the intake air is kept as cool as possible. A fairly accurate rule-of-thumb guide which applies over normal intake temperature ranges is to assume that each 5 degree F rise in intake air temperature cuts the volumetric efficiency of the compressor by 1 per cent. Thus a 30 degree rise would lower the efficiency by 5 per cent. This loss cannot be subtracted from the ideal perfect performance of 100 per cent, as the average compressor has an efficiency of nearer 85 per cent.

Lubrication

Lubrication problems in the compressor are also reduced if the

intake temperature be kept low. Reduction in intake temperatures is quickly evident in the amount of oil which must be removed from the pressurized air in the receiver, intercooler or delivery lines. With the relatively low moisture content of the air at 50 F each cu ft of free air carries into the compressor only about 1/2000 (0.0005) pounds of moisture. This vapor is flashed to steam and must again be cooled to water vapor and/or droplets of condensate when the compressed air is again cooled to the temperature of utilization. In a single-stage compressor, for instance, which is compressing free air to a receiver pressure of 90 pounds, gauge, the final temperature (theoretical, within the cylinder) is 459 F, while that of saturated steam at the same gauge pressure is only 320 F.

During the brief instant this steam exists in the compressor cylinder, it tends to emulsify the lubricant in the compressor. This emulsion does not break down into its earlier constituents of water and oil when cooled, but becomes a sludge or viscous fluid which becomes entrapped in the air stream, and is carried along to the equipment in which the compressed air is being used. There it can clog valves, ports and controls, reduce capacity, and, if passed through spray guns, can account for a high percentage of product rejects. Its removal is a much more expensive operation than its prevention or minimizing, therefore maintaining the flow of air to the compressor intake as cool as possible pays good dividends.

ELTON STERRETT, TEX.

Scheduled Maintenance for Direct Current Motors

By
Stephen L. Kiser

**Intelligent preventive maintenance of
d-c motors will pay off by reducing fac-
tory or maintenance shop repair bills.**

EVERY d-c motor needs a full and thorough overhaul at the factory or in a good electrical repair shop after a certain period of hard operation. But the time between these major maintenance jobs can be extended, and better operation may be expected from every motor if the regular plant maintenance crew follows a few simple rules. Preventive maintenance is partly good operation and partly good housekeeping. Through the proper selection of brushes and the application of an adequate maintenance schedule, repair bills can be reduced.

Brush Selection

Satisfactory operation of direct current motors depends partly upon proper brush performance. In addition to suitable contact drop (voltage drop from contact resistance), the brush should have the correct mechanical properties for the type motor and application which it is to serve. An old type machine having hard flush mica should have a hard abrasive brush to wear away the mica at the same rate as the copper.

Sudden changes in load, as encountered on "pushers" in coke

ovens, are accompanied by commutator sparking, and motors subjected to this treatment should also take hard abrasive brushes to wear off the blackening of the commutator. If long brush wear is desired at the expense of the commutator, a hard non-abrasive brush may be used. Machines having undercut commutators should, in general, take a soft brush. More often a soft brush will be chosen so that the graphite content will lubricate the commutator and also for the high current carrying capacity.

Low-voltage high-current machines should be provided with low-resistance, low-contact drop, metal-graphite brushes. The commutator speed also has a bearing on brush selection. Thus, a brush should be selected to give the proper degree of hardness, abrasiveness, current-carrying capacity, lubrication, and contact drop. Motor manufacturers can help select the right brush for the job.

Cleaning

Keeping the motor clean is of major importance to proper motor



PROPER METHOD OF CLEANING AND SURFACING IS TO PRESS BRUSH DOWN ON A STRIP OF SANDPAPER PLACED BETWEEN BRUSH AND COMMUTATOR.

operation. Many industries have air hose connections by the motors and require that windings be "blown out" daily. While wiping has been found to clean dirt, graphite, oil, grease, or other foreign matter from the commutator, never wipe the commutator with nylon or rayon, for they will stick to the hot surface; canvas duck is probably the best material. A convenient wiper may be made by spreading a ten foot by eighteen inch piece of canvas duck with a light coat of thin flour paste. The canvas strip is then rolled into a tight cylindrical stick. After the stick dries its end can be pressed against the rotating commutator and moved slowly back and forth to clean the surface thoroughly. Many maintenance crews have adopted this wiper method and have found it quite satisfactory.

Spring Pressure

Spring pressure is an important factor in brush wear. Experiments

BRUSH SELECTION

BASIC FAULT	RESULTS AND INDICATIONS
Commutation factor too high	Rapid brush wear
Commutation factor too low	Sparking Noisy brushes
Brush contact drop too high	Commutator heating
Brush contact drop too low	Brush heating Sparking Commutator heating Bar marking Brush glow
Friction coefficient too high	Brush heating High friction Commutator heating Noisy brushes Rapid brush wear
Lack of film forming properties	Sparking Copper particles in brush Noisy brush Streaking of commutator Bright commutator surface Commutator heating Brush heating
Lack of polishing action	Discoloring of commutator Bar marking Dark surface Sparking
Abrasive brushes	Brush glow Copper in brush face Brush heating Bright commutator Commutator wear
Lack of carrying capacity	Brush glow Brush heating

by National Carbon Company show that when spring pressure is too light, electrical forces will wear the brush; and when brush pressure is too heavy, mechanical wear will prevail. Any inequality in spring tension among the brushes will cause unequal current distribution which causes heating of the windings. The brushes with high spring tension will have a lower contact drop and will conduct more than normal current. Spring tension can be measured by a small hand spring scale.

Recommended brush pressures for different types of brushes are given below:

Carbon brushes 1.5 psi
Carbon-graphite
brushes 2.0 psi

Graphite brushes 2.5 psi
Electrographic brushes 3.0 psi

Brush Settings

Brushes should be set in the position that will short circuit the proper coils. The best position can be found by rocking the brushes back and forth until a minimum of sparking is observed. Also be sure that the brush sets are placed symmetrically about the commutator. If the motor is one of the old type, non-interpole machines, best brush setting will be different for each load. If loads vary, it may be best to set the brushes for conditions which are most general. Observation of operating conditions will show which load conditions predominates. With the newer

interpole machines one brush setting will be correct for any load.

In order that contact drop be low, so that current flow will not be restricted, the brush must fit the commutator. To speed the fitting operation any of several methods may be used to give the brush face an initial fit on the commutator. Cutting out the face with a knife, filing, sanding with coarse sandpaper, or grinding on a stone will do. The final fitting should be made with fine sandpaper. Emery dust is a good conductor, so emery paper should not be used. Best results are obtained by pressing the brush down in the brush holder and pulling a piece of fine sandpaper, face out, under the brush in the direction of rotation of the armature. Sandpaper should not be drawn back and forth as this motion will wear the edges of the brush.

Undercutting

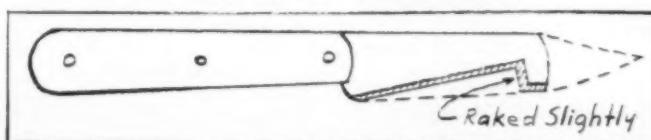
Undercutting is now an established procedure. Many kinds of unique but expensive tools exist for undercutting. All of these tools are for use in the factory or large repair shops. For the most part, the best thing is to keep the mica from becoming high (1/64 inch undercut). To do this an ordinary pocket knife will suffice, but a convenient tool for the job is a good grade paring knife. Grind the blade to the shape illustrated, and it will be very easy to cut out the mica.

Rounding

If the commutator becomes rough and irregular or flat spots appear, severe sparking will result. When irregularities become visible the commutator should be trued immediately, as these faults tend to aggravate themselves. Very fine sandpaper may be used, but a stone is much better because the sandpaper will merely smooth out the bad spots and they will soon reappear. The main thing is not to neglect the commutator surface and let it become irregular; use the stone as soon as flat spots show up. If commutators become very irregular they will have to be turned down on a lathe or ground down on a grinder.

When a stone is used to restore the shape to the commutator the

UNDERCUTTING TOOL MADE FROM KITCHEN KNIFE.



surface film is destroyed. Abrasive brushes do the same thing. Proper surface may be restored by pressing a hard block of wood, such as oak or maple, against the turning commutator.

Bridging

Closing or bridging are useful emergency measures when open-circuited, short-circuited or grounded coils occur. These faults, along with loose connections, cause snappy blue sparks on the commutator. Use of a magneto and voltmeter to test the circuit is very convenient, but where these are not available visual inspection must be used. Once the faulty coil is found, an attempt to repair the coil by splicing the open ends and insulating with tape may be tried (closing). If closing is not advisable, the segments connected to the ends of the coils may be connected by a piece of wire approximately the same size as the coil (bridging). Of course, a new coil will have to be inserted later.

Inspection Procedure

The frequency of inspection and degree of thoroughness vary, and will have to be determined by the conditions prevailing. Any inspection schedule must therefore be elastic and adapted to the needs of each plant. The accompanying schedule is based on conditions where heavy duty and dirt prevail.

TROUBLE CHART

TROUBLE	CAUSE	CURE
Dirty commutator surface Flashover Bar burning Flat spots	Dirty motor	Cleaning
Winding heating	Clogged ventilation	
Brush heating Commutator heating High friction Flat spots Flashover Commutator burning Sparking Rapid brush wear Noisy brushes	Incorrect spring tension	Brush Adjustment
Brush heating	Improper brush fit	
Sparking Commutator heating Unbalanced armature currents Winding heating	Unequal brush spacing	
Commutator black burning Sparking Rough commutator surface Low commutator bars Rapid commutator wear	High mica and feather-edge mica	Undercutting
Rough commutator surface Sparking Eccentric surface Flat spots	Poor commutator surface	Surfacing
Bright commutator Dull commutator	Lack of commutator surface film	Burnishing
Unbalanced armature currents Unbalanced field Sparking Bar burning Low commutator bar	Short-circuit ground and open-circuit of windings	Bridging and Closing

MAINTENANCE SCHEDULE

EVERY OTHER DAY

1. Examine commutator and brushes.
2. Check oil level in bearings.
3. See that oil rings turn on shaft.
4. See that armature and commutator are free of oil and grease from the bearings.
5. Examine switches, fuses, and other controls.
6. Start motor and see that it comes up to speed in normal time.

EVERY MONTH

1. Clean motor thoroughly, blowing dirt from windings and wiping commutator and brushes.
2. Inspect commutator and brushes.
3. Check brushes and renew any that are more than half worn.
4. Examine brush holders and clean them if dirty; make sure that brushes ride free in the holders.
5. Check brush pressure.
6. Check brush position.
7. Drain, flush, and renew oil in sleeve bearings.
8. Check grease in ball or roller bearings.
9. Check operating speed or speeds.
10. See that end play of shaft is normal.

11. Inspect and tighten connections on motor and controls.
12. Check current input and compare with normal current indicated on name plate.
13. Run motor and examine drive critically for smooth running, absence of vibration, worn gears, chains, or belts.
14. Check motor foot bolts, end shield bolts, pulley, coupling, gear and journal set screws, and keys.
15. See that all motor covers, belt and gear guards are in good order, in place, and securely fastened.

EVERY SIX MONTHS

1. Clean out and renew grease in ball or roller bearing housings.
2. Visually check winding insulation if instruments are not available, otherwise, test insulation by megger or magneto and voltmeter.
3. Check air gap.
4. Clean out magnetic dirt that may be hanging on poles.
5. Check clearance between shaft and journal boxes of sleeve-bearing motors to prevent operation with worn bearings.
6. Clean out undercut slots in commutator.
7. Examine connections of commutator and armature coils.
8. Inspect armature bands.

Fork Trucks at Cross Cotton Mills

LOW operating costs with very little expense for maintenance, coupled with a marked decrease in man-power and man-hours used in the handling of incoming supplies and outgoing shipments, are among the advantages derived by Cross Cotton Mills Company since installation of two storage battery-powered fork trucks at its plant located in Marion, North Carolina. In addition, according to C. F. Goldsmith, cotton buyer for the company, greater utilization of storage space is obtained—twice to three times as much material being placed on the

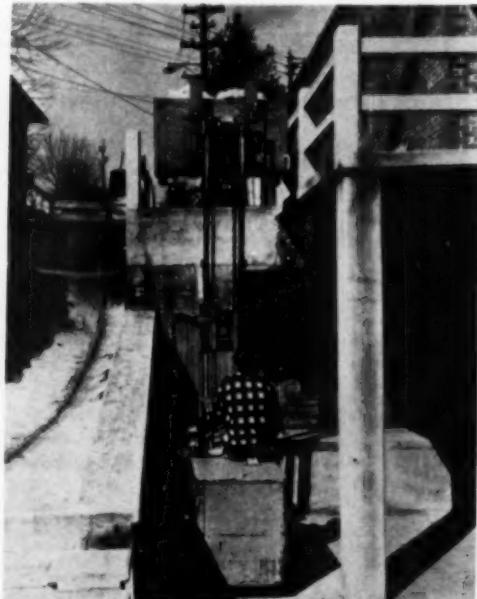
same square footage of warehouse space as under manual methods.

Incoming Supplies

Instances of savings in time and labor cited by Mr. Goldsmith include those in one of the largest and continuing operations—the handling of incoming supplies of baled cotton. The bales, which weigh about 500 lb each, arrive in car-load lots of 100 at a time. Under methods of handling which prevailed prior to the installation of the fork trucks, two men were used to "break" a car and tumble the bales to the floor of the mill's

OVERHEAD SPACE BETWEEN PRODUCTION DEPARTMENTS, PREVIOUSLY UNUSED, HAS BEEN MADE AVAILABLE FOR STORAGE OF SHIPPING CARTONS, PAPER AND OTHER ITEMS IN CONSTANT DEMAND, THROUGH CONSTRUCTION OF MEZZANINE AND USE OF FORK TRUCKS.

MOVEMENT OF BINS OF WASTE FROM COTTON OPENING MACHINES TO BALING AND STORAGE AREA LOCATED AT STREET LEVEL—IS ONE THAT FORMERLY REQUIRED TWO MEN, PUSHING WHEELED BINS OVER LONG ROUTE UP A STEEP INCLINE, SOME TEN MINUTES TO PERFORM.



TWO BALES AT A TIME—COTTON IS DECKED FOUR TO SIX BALES HIGH.

receiving yard. Three hand-truckers would move the bales, one at a

time, first to the scale for weighing, then to the sampler, and then into the warehouse. Here, with manual effort, the bales would be unloaded, up-ended and stored. A warehouse-man assisted the truckers in this latter operation.

Because bales could not be double-stacked, excessive floor area was occupied, the space from top

of bale to ceiling being left empty. Several hours were spent each day by the eight men engaged in the work in addition to an overseer before a car's contents would be warehoused.

Since installation of the fork trucks, only five men plus an overseer, are used in the car unloading-warehousing operation, for a

total of some $7\frac{1}{2}$ man-hours per car. In storage the bales are handled two at a time by the fork truck and stacked four- to six-high. From two to three times as many bales are thus now accommodated on the same floor area, while there still is available area up to the ceiling for additional storage should the need arise.

New Stoker Burns Wood Chips

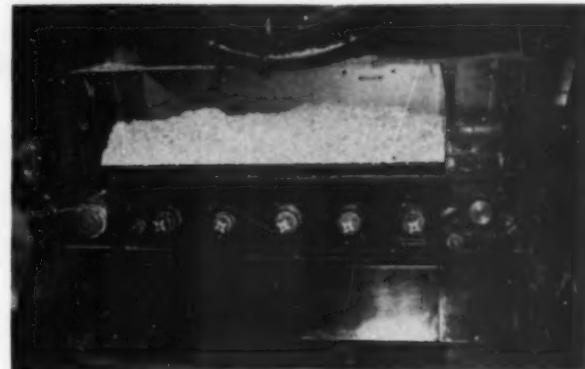
Installation saves over \$3,000 in six months for North Carolina Laundry.

WOOD chips and sawdust, while long considered a usable waste fuel, have been avoided by most boiler operators because of handling difficulties, poor burning efficiency, and bad smoke and fly ash conditions. The obvious trouble has always been that stokers, grates, and furnaces have seldom been designed to meet the requirements for efficiently burning wood chips. In fact, it has long been the opinion of boiler designers that a Dutch oven was almost essential to correct burning of wood.

Around High Point, North Carolina, the furniture industry can furnish about all the fuel needed by the smaller boilers in the area, and furnish it at practically no cost, if the boiler operators are willing to burn it. And there is no question that it can be burned and burned efficiently in a standard furnace if a few changes are made in the grate and an adequate stoker is provided.

Installation

A typical example of a small boiler efficiently burning wood chips is the boiler in the High Point Laundry. This laundry uses a 200 hp boiler of a standard H.R.T. design. For a number of



years it had been hand fired, using both coal and wood chips for fuel.

About a year ago, Paul G. Wilson, manager of the laundry, purchased a Fyr-Feeder Automatic Combustion System from American Coal Burner Company. This system installation involved the removal of the old grate and its replacement with a stationary grate made up of block castings perforated with $\frac{1}{4}$ -in. holes. A fan was installed to blow into the area below the fire box, the air moving into the combustion chamber through the perforations in the stationary grate.

The stoker consists of a hopper for the wood chips, five chain driven screw conveyors which carry the chips from the hopper into the combustion chamber, and a fan to spread the chips over the chamber.

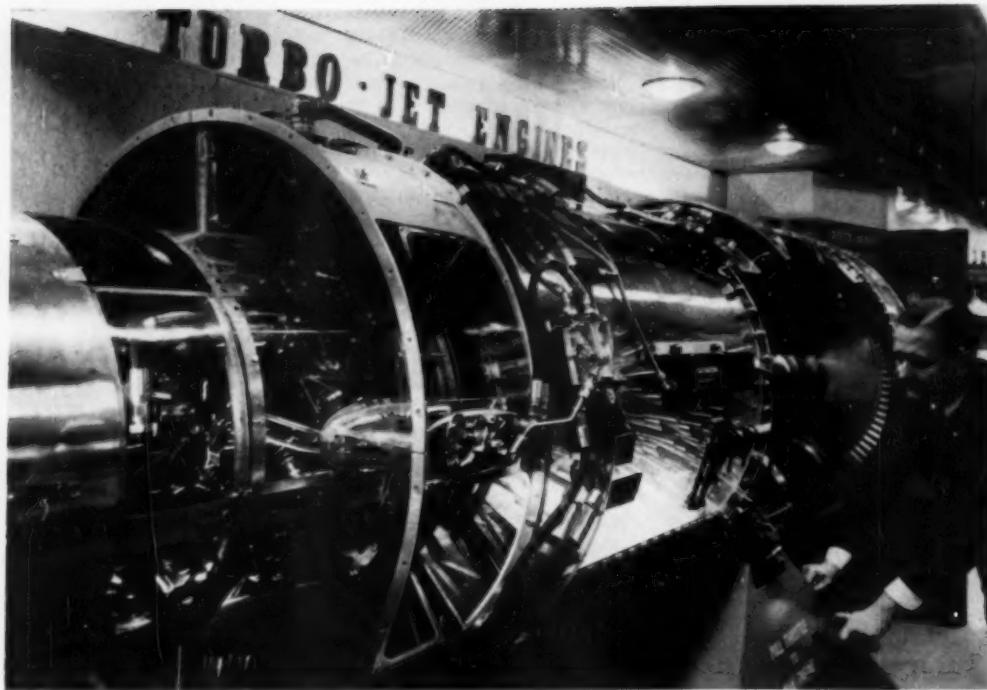
Both fans are adjustable in output, and the speed of the screw conveyors is variable, the chain drive being driven by a Reeves variable speed pulley arrange-

ment. With air and fuel fed fully adjustable and with the further help of a damper on the stack, it is possible to completely burn the chips within the combustion chamber whether at minimum or maximum load. Actually, no fuel bed ever builds up. The chips are almost all burned in suspension, and no smoke or fly ash is visible at the stack.

Economy

The best proof of the results attained through the use of this system of burning sawdust and wood chips can be found in the statement made by Mr. Wilson on savings accomplished.

"We have saved more than \$3,226.95 in the first six months of operation, according to the last report of our auditor. Besides we have experienced a constant steam pressure which has helped in speeding production. There is no way to figure the savings here, but it is probably equal to the savings in fuel."



MOST OF THE MAJOR EXHIBITS ABOARD GENERAL ELECTRIC'S TRAIN GO THROUGH AN OPERATING CYCLE AUTOMATICALLY, OR CAN BE ENERGIZED BY VISITORS. HERE IS A MODEL OF THE J-47 TURBO-JET ENGINE.

MORE POWER TO AMERICA

General Electric Company's "More Power to America Special" Train Starts Southern and Southwestern tour

The "More Power to America Special," a 10-car silver streamliner carrying exhibits of more than 2,000 electric products, systems and techniques will roll into Atlanta, Georgia, January 4 for a two-day visit.

The exhibit train sponsored by the General Electric Company's Apparatus Department is the first of its kind in industrial history, according to C. L. Redd, manager of the department's Southeastern District, with headquarters in Atlanta.

One of the primary purposes of the train, Redd said, is to stimulate greater American production through the use of electricity. He pointed out that the train represents the first attempt to display, in one series of related exhibits, the complete range of products for producing, distributing and using electric power.

During its two-day Atlanta showing, January 4 and 5, Redd said, the "Special" will be located on tracks of the Southern Railway System at the intersection of North Boulevard and Tenth Street. It will be open from 9 a.m. to 5:30 p.m. for inspection by invited representatives of utilities, industries and municipalities in the greater Atlanta area.

The train will be seen by representatives of industry, government, the armed forces and civic

groups, he said. He explained that the exhibits have been designed specifically to interest those who produce electric power and those who put it to work in industry and the community.

Exhibits aboard the quarter-mile-long train cover such equipment as turbines, hydro-generators, substations, transmission equipment, meters, complex drive systems, industrial and street lighting fixtures, precise instruments, welding and heating equipment, controls, diesel-electric locomotives, urban transit and railroad equipment.

Other displays relate to atomic power, aircraft jet engines, weather research, guided rockets, ultrasonics, ship propulsion equipment, gunfire control systems, and "snow-making" techniques.

Purpose of the train, according to the G-E spokesman, is "to disseminate 2,000 electric ideas which can contribute to a more productive America."

Virtually all the exhibits emphasize the advantages of electrification in terms of increased production, reduced costs, and improved product quality.

Most of the major exhibits aboard the train go through an operating cycle automatically, or can

be energized by visitors. Visitors can work the controls of a diesel-electric switching locomotive, and actually "operate" a miniature model switcher and cars. Other "operating" exhibits include conveyors, hoists, gun turrets, "mechanical hands" for handling radioactive materials, and induction heating equipment.

The exhibits follow a planned logical order: visitors first see equipment for producing power, then apparatus for transmitting and distributing it, then, finally, techniques and products for efficiently using it.

The schedule for the train's exhibition in the Southeast and Southwest areas is:

Jan. 4-5	Atlanta, Ga
Jan. 8-9	New Orleans, La.
Jan. 10	Mobile, Ala.
Jan. 11	Montgomery, Ala.
Jan. 12	St. Petersburg, Fla.
Jan. 15	Tampa, Fla.
Jan. 16	Miami, Fla.
Jan. 17	Orlando, Fla.
Jan. 18	Jacksonville, Fla.
Jan. 19	Macon, Ga.

Jan. 22	Savannah, Ga.
Jan. 23	Columbia, S. C.
Jan. 24	Raleigh, N. C.
Jan. 25	Greensboro, N. C.
Jan. 26	Charlotte, N. C.
Jan. 29	Greenville, S. C.
Jan. 30	Knoxville, Tenn.
Jan. 31	Nashville, Tenn.
Feb. 1	Chattanooga, Tenn.
Feb. 2	Birmingham, Ala.
Feb. 5	Jackson, Miss.
Feb. 6	Shreveport, La.
Feb. 7	Beaumont, Texas
Feb. 8-9	Houston, Texas
Feb. 12	Corpus Christi, Texas
Feb. 13	San Antonio, Texas
Feb. 14	Waco, Texas
Feb. 15	Abilene, Texas
Feb. 16	Ft. Worth, Texas
Feb. 19-20	Dallas, Texas
Feb. 21-22	Oklahoma City, Okla.
Feb. 23	Tulsa, Okla.
Feb. 26	Amarillo, Texas
Feb. 27	Albuquerque, N. M.
Feb. 28	El Paso, Texas

50th Annual National Power Show Scheduled for San Antonio, Texas

The Golden Anniversary NATIONAL POWER SHOW of the National Association of Power Engineers, Inc., will be staged in SAN ANTONIO, TEXAS, August 21-23, 1951. San Antonio will be converted into a three day market center for power equipment, materials, and supplies.

Held in conjunction with the National Power Show will be the 68th Annual National Convention of the National Association of Power Engineers, Inc.

Maintenance Show— Cleveland, Jan. 15-18

The Plant Maintenance Show and the concurrent Conference on Plant Maintenance will be held at the Public Auditorium, Cleveland, Ohio, Jan. 15-18, 1951. The conference is being sponsored jointly by the American Society of Mechanical Engineers and the Society for the Advancement of Management.

In addition to general sessions, separate conference meetings will be devoted to special problems in particular industries. These will include chemicals, paper and paper products, food, and metal working. Separate sessions also will discuss lighting equipment, problems of the small plant, electrical equipment, and power plant and heating equipment.

Advance registration cards and hotel reservations may be obtained by writing Clapp and Poliak, Inc., 341 Madison Ave., New York 17, N. Y.



Committee Plans for Houston Instrument Show

At a recent meeting of the Houston Section Committee of the Instrument Society of America, plans were discussed for the Sixth National Instrument Conference and Exhibit to be held in the Sam Houston Coliseum, September 10-14, 1951.

W. H. Fortney, Humble Oil & Refining Company, Baytown, Texas is Chairman of the Houston I.S.A. 1951 Convention Committee. Seated, left to right: **Dale Matix**, Cities Service Corp., Lake Charles, La.; **C. R. Miller**, General Tire and Rubber Co., Baytown, Texas; **M. J. O'Neal**, Shell Oil Co., Houston, Texas; **C. W. Bates**, Humble Oil & Refining Co., Baytown, Texas; **Prof. G. L. Farrar**, Department of Chemical Engineering, A & M College of Texas; **M. K. Anderson**, Carbide and Carbon Chemical Co., Texas City, Texas; **W. H. Fortney**, Humble Oil & Refining Co., Baytown, Texas; and **Paul H. Buehner**, Convention Manager, Houston Chamber of Commerce.

Standing: **W. B. Rawson**, Vice President, Maintenance Engineering Corp., Houston, Texas; **A. Costa**, Westcott & Greis, Houston, Texas; **R. E. Hanson**, Leeds & Northrup Co., Houston, Texas; **E. E. Kleir**, Foxboro Co., Houston, Texas; **R. L. Nichols**, Magnolia Petroleum Co., Beaumont, Texas; **C. L. Garner**, Garner Instrument Co., San Antonio, Texas; **L. C. Books**, Shell Oil Co., Houston, Texas; **I. K. Farley**, Brown Instrument Div., Houston, Texas; **Richard Rimbach**, Executive Secretary, I.S.A., Pittsburgh, Pa.

Trends in Steam Spray Finishing

SPRAYING organic finishes with superheated steam instead of compressed air was reported as a new development in the February '49 issue of SOUTHERN POWER & INDUSTRY. In the process, paint is both heated and atomized at the nozzle—thus eliminating need for preheating. High viscosity paints can be used and faster work is possible.

New Finishing Method

The process gives industry a new and more efficient method of applying coating compositions. It does not necessarily provide a better or glossier finish to the product, but does effect

Du Pont development, employing superheated steam instead of compressed air for spraying organic finishes, reaches license stage. Process not a cure-all but recommended for big volume users.

large savings in the manufacturer's overall finishing costs.

There is much interest in steam spray and the number of industrial users is increasing. Some manufacturers, on the other hand, see no overall advantage in the new method. It is not recommended except for big volume users of finishes who produce their goods on an assembly line.

TODAY, most finishing materials used in industry are applied by spray methods, with air as the atomizing medium at pressures normally in the range of 60-80 psi. Atomization losses increase as the air pressure is increased. At normal pressures, the spray efficiency rarely exceeds 65 per cent, and is usually well under that figure.

Spray losses may be divided into two categories when air is used as the atomizing medium:

1. Overspray losses which occur when the spray fan is projected beyond the edge of the ware.
2. Atomization losses in the

form of paint particles which are diverted from the ware by the rebounding air stream. The losses from this source are usually greater than the overspray losses.

The phenomenon involved when superheated steam is released from a paint spray gun is immediate dissipation of velocity energy into the paint and the immediately surrounding atmosphere. There is, therefore, a minimum of turbulence at the surface of the ware being coated.

Operational Notes

The superheated steam used for atomization is dry, and the amount

of moisture deposited in the film is insignificant. Constant bleeding of the gun eliminates any condensation which might cause actual drops of water, which would be objectionable.

To insure dry steam at the point of atomization the steam must be superheated. The pressure used for atomization is approximately 60 psi with superheat of at least 10F at the gun. A bare hand can be placed in the atomized spray fan without discomfort at a distance of about twelve inches from the gun.

Although normal spray equipment can be used for steam spraying, it would be too hot to handle even with gloves. Specially designed heat insulated spray guns have been produced which work quite satisfactorily on a production basis, and further improvements will likely be made.

Du Pont's production experience to date has been largely with the alkyd and alkyd urea formaldehyde type finishes widely used in industry today. Laboratory experience, however, indicates suitability for a wide variety of finishes.

The use of heaters for hot spray application is rather widespread. It is gaining in acceptance because of collateral advantages. Steam spray refers primarily to the actual process of atomization and, therefore, is useful in conjunction with hot spray equipment.

The cost of equipment to use the

Steam vs. Air Spray

1. Actual material savings of the order of 10-20 per cent can be expected in most applications. Obviously this magnitude of the savings is influenced by factors such as local conditions, size and shape of article being coated, etc.
2. In some cases the film thickness per coat can be increased by steam application. The difficulties of pinholing and popping, normally caused by trapped air, are reduced.
3. Fewer cleanings of the spray booth are necessary, because of the reduced spray losses.
4. Basically, steam is a cheaper propellant than compressed air, although be it steam or air, the operating cost of the propellant is a relatively minor one.
5. The labor savings associated with the above can be sizeable.
6. Steam spray makes it possible to apply finishes heavier in body and higher in solids, thereby saving at least a portion of the cost of the reducing thinners required.

steam spray process is relatively small in comparison with the economies involved and the attractive return on investment which will be realized by volume users of finishes.

Although the basic principles of steam spray are comparatively simple, a definite amount of technical assistance in addition to the special equipment is necessary to insure foolproof operation.

The process is covered by U. S. Patent 2,511,797 issued on June 13, 1950. Management of Du Pont's Finishes Division at Wilmington, Delaware plans to offer the process to the public on a license basis.

Novel Waste Neutralization System

Fiber plant process combines four wastes into one effluent.

AT one of the Southeast's largest synthetic fiber plants automatic pH control helped solve a complex waste neutralization problem. Four different types of waste—sanitary sewage, sulfide, alkaline, and acid—must be treated before they can be discharged into the river. Through a unique setup combining four wastes into one effluent, plant wastes are neutralized effectively and completely.

Method

1—Sanitary wastes are first fed to Imhoff tanks, the sludge going to drying beds, and the effluent to trickling filters. The liquid waste then passes to a retention basin.

2—Sulfide wastes are oxidized to sulfates by bacteria derived from the sanitary sludge. After filtering the resulting sulfates flow into the same retention basin with the sanitary effluent.

3—Acid wastes, consisting of dilute sulfuric acid, soluble salts, and organic matter are screened in an acid storage chamber and then fed into the treatment chamber.

4—Alkaline wastes from the manufacturing and finishing departments are mixed before being sent to the same treatment chamber with the acid waste. Into this treatment chamber also flow the sulfide and sanitary effluents from the retention basin. Here, the alkaline wastes neutralize the acid to some extent, but the total waste is still predominantly acidic.

The combined wastes are thoroughly mixed and agitated and passed into a neutralizing chamber, where the remaining acidity is neutralized by the controlled addition of a 10-11% mixture of lime slurry. A sample of the mixture

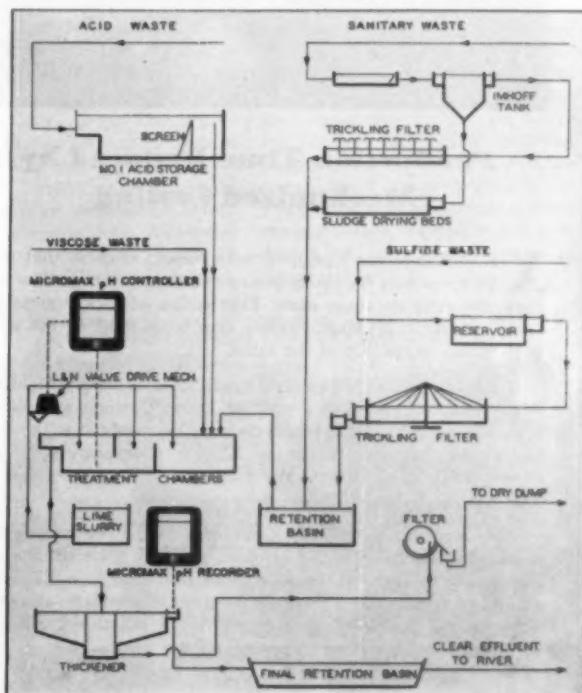
in the neutralizing chamber is then pumped to a glass electrode assembly. Leads connect the electrode assembly to a Leeds and Northrup Micromax pH controller, which continuously records the waste pH as detected at the electrodes. Then, through a valve drive mechanism which automatically operates a butterfly valve on the lime feed line, the Micromax instrument controls the flow of lime slurry to the treatment chamber.

To neutralize this waste, the plant uses about 20 to 50 tons of lime per day. The control equipment

maintains optimum pH to a tolerance of plus or minus 1 pH at the liming point. Complete waste neutralization is obtained with minimum lime consumption.

Final preparation of the waste consists of removing suspended solids in a conical thickener. At this point a tolerance of plus or minus 0.3 pH is maintained. Effluent flows to a final retention basin for settling, where pH is averaged out. The final effluent then flows through a subsurface outfall to the river—clear, neutral and free from oxidizing bacteria.

SCHEMATIC DIAGRAM OF WASTE NEUTRALIZATION SYSTEM.





Helping the MAN-IN-THE-PLANT

Welding Machine Maintenance

PREVENTIVE maintenance of welding machines involves a scheduled program of lubrication, mechanical work and electrical

work. As the sub-assemblies are finished by grinding, the welding machines are subjected to dust. This affects the delicate control

Readers are invited to send in kinks, ideas, and suggestions. Payment is made for all material accepted.



Production Time Reduced by Mechanized Cutting

X-RAY tables are equipped with rocker arms so that x-ray pictures may be taken in any required position. The table rests and rolls on these arms. Fabrication of rocker arms presents a difficult problem. Rocker arm parts must be cut in the same plane as the top of the table.

By using an Oxfeld cutting machine, installed by The Linde Air Products Company, a unit of Union Carbide and Carbon Corporation, fabrication problems have been solved at the Baltimore Plant of Westinghouse Electric Corporation. In the illustration, both rocker arms are being oxy-acetylene cut simultaneously.

The material is mild steel, one inch thick. The tracing head automatically follows the templet and the desired shape is duplicated in both workpieces. Note that only a minimum of clamping is needed. No longer is there a problem of correct alignment. Actual cutting takes only a few minutes; the balance of the time is consumed in setting up the work.

and timing devices with which spot welders are equipped. The housing must therefore be wiped out with rags, and cleaned with blasts of air as often as once a week.

Spot Welders

Some machines are required to make welds at a rate as high as 130 spots a minute. This places a heavy load on the sequence and timing controls. Sometimes the effective life of such vital parts as contacts or bellows are reduced to about one week. It is best to keep on hand a batch of spare units of all types, tubes, relays, contacts, switches, capacitors, transformers, valves and bellows. Any defective parts are removed and overhauled in the electrical shop before being returned to maintenance stock.

The air valves of the pneumatic cylinders have to be frequently checked for leaks, and to insure smooth operation the lubrication of the cylinders is also important. The use of neoprene packing on these cylinders has greatly reduced the maintenance problem as compared to that required by leather packing.

The spotwelding machines are installed in groups which draw current from the general network of plant power feeders. Because they take relatively large currents, the machines are interlocked in such a way as to eliminate their simultaneous operation and hence peaking of the load. As part of the maintenance it is necessary to inspect the efficiency of these interlocks.

Arc Welders

The maintenance of arc welders is simpler than that of the spot welders. Burned rheostat contacts are the usual difficulty and so spare rheostats are stocked to prevent shutdowns. The condition and

functioning of the brushes and switches are periodically checked. The maintenance of the flashwelders and the atomic hydrogen machines is more of an individual matter. They are regularly inspected for appropriate electrical and mechanical defects.

Once a year, each welding machine is removed to the electrical shop for a general overhaul and renewal of wiring. Although with good preventive maintenance on

the floor, many machines can be kept in operation for as long as two years without a general overhaul.

A record of all the work performed and scheduled on each machine is kept. Lubrication is carried out according to the instructions issued. Special cards indicate the parts to be lubricated and the appropriate lubricant to be used.

Copper electrodes are dressed with emery cloth to remove all traces of oil, oxides and dirt. The

seamwelder is inspected to see that a uniform pressure is maintained on the electrodes during welding. An oscillograph is used to check the timing cycle and current amplitude of the spot welding machines.

These are some typical maintenance operations which are responsible for sharply reducing the breakdown time and for producing a more economical operation of the production tools.

Convection Oven Solders Radiator Cores for Houston Metalworking Plant

THE Daniel Auto Radiator Manufacturing Company, Houston, Texas, has installed a solder sweating oven to solder tubular radiator cores. The oven was designed by the Lanly Company, Cleveland, Ohio, to heat a tubular radiator core to soldering temperature in 30 seconds with the oven at operating temperature.

Mr. P. R. Daniel, President of the Daniel Radiator Manufacturing Company states that by using this air heated solder sweating oven, radiator cores are removed from the oven with a clean attractive color. Previous methods not only produced cores at a very slow rate but also discolored the cores, requiring additional processing before the core could be packed for shipment.

Oven Operation

The oven body is of panel construction composed of a blanket of mineral wool enclosed between two metal sheets. The inside sheets of all panels are of stainless steel to resist the corrosive action of the soldering flux. A stainless steel tray supports the radiator core in the oven.

The oven is heated by a direct fired gas air heater and the heated air is circulated rapidly through the oven by a high temperature heat fan. The gas burner on the air heater has a spark ignited pilot

whereby the burner can be ignited by pressing a switch on the control panel.

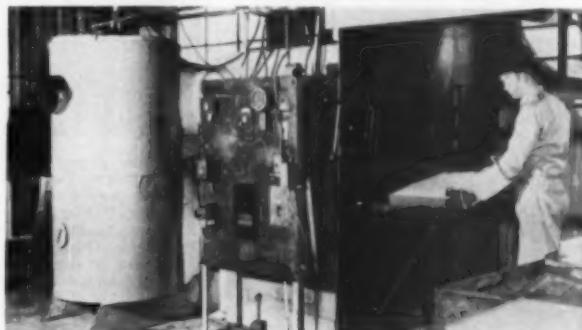
Automatic temperature and safety controls as recommended by the Associated Factory Mutual Insurance Companies assures safe and satisfactory operation of the oven. The normal operating temperature of the oven is maintained by a Partlow Electric Controller which operates a diaphragm gas valve in the main gas line. In addition, a high limit safety controller is provided as a safeguard against failure of either the temperature controller or the control valve. The high limit controller will close a safety shutoff valve should the maximum temperature be reached. The safety shutoff valve will prevent damage

to the oven or the heat fan from high temperature.

An air flow switch is placed at the heat fan inlet and so connected in the control system that should the fan fail to handle air, the oven is automatically shut down. The air flow switch also energizes the time delay relay in the Wheelco Flameotrol so that the heat fan must complete a definite purging cycle which clears the oven of any possible accumulation of explosive gases.

After the purging cycle is completed, it is possible to ignite the pilot burner electrically. When the pilot flame is established, its presence is detected by the flame sensing element of the Flameotrol. The automatic temperature controller then opens the control gas valve and the oven comes up to operating temperature. If for any reason the flame should be extinguished, the Flameotrol will immediately close the gas valves to prevent any possibility of an explosion due to flame failure.

THE OPERATOR IS PLACING AN ASSEMBLED RADIATOR IN THE OVEN FOR SOLDERING. THE GAS-FIRED AIR HEATER IS SHOWN AT LEFT.





INSTALLING 1435 LB STAINLESS STEEL, STEAM-JACKETED KETTLE BY MEANS OF FORK-TYPE POWER INDUSTRIAL TRUCK.

Power Truck Saves Time for Chemical Plant

AMATERIAL handling engineer recently compiled a list of basic classifications of industries in the United States and noted that one type of power industrial truck is either now used or is applicable in practically all, due to similarity

of handling problems. This is the electric power, medium-weight, high-lift fork truck—a universally useful machine. But the compact fork truck, safe, dependable and economical, fits into more general production, storing and shipping

By S. R. Brookshire

Material Handling Engineer
Arnold, Hoffman & Co., Inc.,
Charlotte, N. C.

operations than any other type.

Take for example work in the Charlotte, N. C., plant of Arnold, Hoffman & Co., Inc., manufacturing chemists. Main use of their Elwell-Parker fork truck of the type mentioned is in loading, unloading and moving chemicals in dry and in liquid form in drums and buckets.

Four loaded drums, each weighing 400 to 500 lb, on a pallet, are stacked three-high. Twelve drums can be stored in a floor area ordinarily accommodating only four. "We would never get the job done with only manual labor," says a plant official.

The same truck with its fork is used in place of a chain hoist in changing and installing stainless steel, steam-jacketed kettles, weighing 1435 and 2600 lb—safely, in a fraction of the time formerly required by other methods.

Diesel Standby for Hydro Plant

MR. E. T. Prichett, General Superintendent of the Juliette Milling Company, a water powered textile mill at Juliette, Georgia, reports that he has effectively eliminated the chances of production shutdowns due to low water and floods by installing standby Diesel generating power.

Eight months prior to the purchase of the new emergency power plant, a severe flood brought serious consequences to the mill as it threw the machinery completely out of commission shutting down the drinking water filter plant and all other electrically driven apparatus as well as the power supply for mill employees' homes.



THE NEW STANDBY POWER SUPPLY CONSISTS OF A GENERAL MOTORS CORPORATION, TWIN 6, DIESEL ENGINE AND A G. M., SINGLE 6 ENGINE, BOTH OF WHICH ARE BELTED TO A SINGLE GENERATOR—250 KW GENERAL ELECTRIC. THE REASON FOR THIS UNUSUAL HOOK-UP IS THAT THE GENERATOR WAS THERE ALREADY AS WAS THE 6 CYLINDER G. M. DIESEL ENGINE. PURCHASE OF THE NEW TWIN 6 G. M. DIESEL COMBINED WITH POWER AVAILABLE IN THE SINGLE 6 ENGINE, GAVE JULIETTE MILLING COMPANY AMPLE POWER FOR EMERGENCY USE ON THE 250 KW GENERATOR.

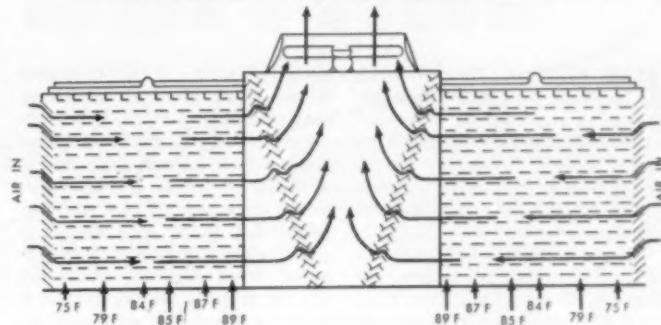
Two Temperatures From One Cooling Tower

WATER from cooling tower at two temperatures is provided for a gas compressor station in Texas: one for cylinder jackets (at 88 F) and the other for coolers (at 77 F).

Temperature stratification is very pronounced in the cold-water basin of a cross-flow cooling tower. Many users are capitalizing on this feature for special cooling by collecting water near wet-bulb temperature.

This is accomplished by building a partition in the cold-water collecting basin near the louvered side walls of the cooling tower.

THIS DIAGRAM OF THE MARLEY COMPANY SHOWS TYPICAL WATER TOWER JUST BEFORE WATER ENTERS THE COLD WATER BASIN. TEMPERATURE OF WATER IN COLD WATER BASIN AVERAGES 85 F.



Shop Made Coupling Guard

OUR 5000 kw motor-generator set uses a conventional type coupling that presents no particular protruding features but does present something of a personnel hazard when bearing temperatures, oil level checks, and other house-

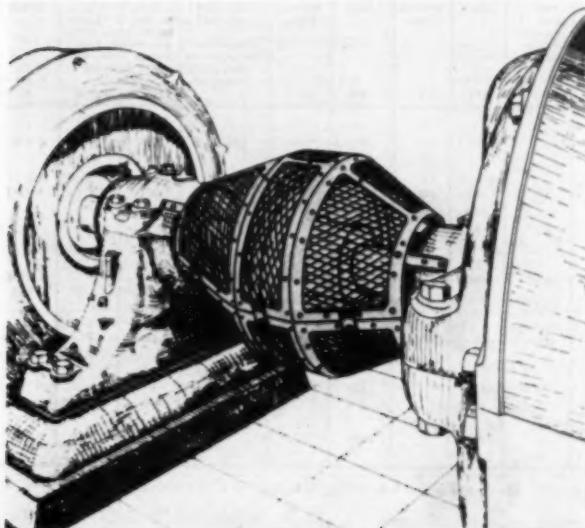
keeping functions are performed.

Formerly a brass railing enclosed the coupling, but this was eliminated when a red tile floor was laid over the original concrete. This new surfacing throughout the building is machine scrubbed and

waxed, and this requires the janitors to have access to the power room. Since these people are not expected to observe the cautions commonly practiced by electrical personnel, special attention was given the coupling for their benefit.

Wishing to maintain the high class structural appearance of the area, expanded aluminum stock with $\frac{5}{8}$ " openings was selected for the guard because of its bright, clean appearance and its ability to be flexed sufficiently to conform to the curvature of the frame. Aluminum sheet $\frac{1}{8}$ " thick was used to develop the frame structure in two halves. The screen stock was riveted to the frame and the unit is provided with mounting straps attached to the bearing caps by $5/16$ " cadmium plated cap screws.

Initially the guard was permanently fastened together at the median line by bolted clips but this proved to be troublesome when the coupling required attention, or the interior of the guard became lint coated. The addition of a pair of butt hinges and a shop fabricated hasp now makes it possible to open the top half of the guard with a minimum of effort, while the bottom section remains fixed in position.



How Thick To Insulate

This Method Determines the Economic Thickness To Which Thermal Insulation Should Be Applied.

THE Industrial Mineral Wool Institute, New York, calls attention to a method of determining the economic thickness to which thermal insulation should be applied—a method formulated by the Public Service Electric and Gas Company.

Heat is evaluated dollar-wise at each piece of equipment. For example, 1,000 Btu per hr may have a value of \$35.00 at a steam turbine, but may have a value of only \$2.00 at a boiler feedwater heater. These figures take into consideration not only fuel costs and efficiency, but also overhead and amortization over the capitalized life of the equipment.

Procedure

Insulation is first considered to the thickness recommended* for the particular operating temperature in question. For example, a unit to operate at 270 F would

normally call for a 1½"-thickness of the block form of insulation used by Public Service. If the addition of an extra thickness of insulation would result in a saving of 15,000 Btu per hr, and 1,000 Btu per hr are evaluated at \$2.00, then \$30.00 (i.e. 15,000 \div 1,000 \times 2) could be spent for additional insulation. Since this sum would not pay for an extra thickness on most pieces of equipment, additional insulation would not be economical. If 1,000 Btu per hr are evaluated at \$15.00, then \$225.00 (i.e. 15,000 \div 1,000 \times 15) would be available for additional insulation, and an extra layer would be economical.

When Public Service lets out bids to contractors, forms similar to that shown here are given to each contractor. Information is supplied by Public Service in columns 1, 2, 3, 4, 5, 6, 7, 9, and 13. The contractor supplies information for columns 8, 10, 11, 12, and

14. The information in column 14 is merely to check roughly the contractor's calculations. If a bid is submitted which obviously has an error in the calculation of the sq ft area, the contractor is given a chance to reconsider. The dollar values of column 13 are blocked out as confidential information.

The following procedure is used to select the lowest bidder. Assume two bids are received, one offering a job costing \$700 which when completed will allow a loss of 50 Btu per sq ft per hr; the other, at a cost of \$500, allows a loss of 70 Btu per sq ft per hr. Suppose the area of the unit being insulated is 6,600 sq ft and that 1,000 Btu per hr at this stage of the system is worth \$2.00. The value of the lost heat on the \$700 job would be $6,600 \times 50$

$\times 2$ or \$660. This plus 1,000

\$700 gives a total of \$1,360. Following the same procedure, the total cost of the \$500 job would be \$1,424. Therefore, the \$700 job would be the most economical in the long run.

*Commercial Standard OS1117-49, "Mineral Wool Insulation For Heated Industrial Equipment" U. S. Department of Commerce (Individual copies available free of charge from the Industrial Mineral Wool Institute, 441 Lexington Avenue, New York, N. Y.)

INSULATION DATA	DETAIL SPECIFICATION PART 111 - DUCTS, PLATES AND EQUIPMENT													AREA (sq. ft.)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)			
	OWNER'S DUCTS, OR PLATE NO.	INTERNAL OR EXTERNAL APPLI- CATION	COVERING THICK- NESS	CEMENT THICK- NESS	HARD CEMENT THICK- NESS	INSUL- ATION PROTECT- ING CEMENT THICK- NESS	WEATHER- PROOF FINISH	MAX. TEMP.	MAX. SURFACE TEMP.	NORMAL TEMP.	NORMAL SURFACE TEMP.	BTU LOSS PER SQ FT PER HOUR	GUARANTEED HEAT CONDUCTIVITY Btu per sq ft per degree temp. diff., per hour, per linear foot (based on normal temp. and 60 F ambient)	HEAT EVALUATION		
Box Air Duct A.D. to Burner 68297-48-0004 68298-48-1000	Int.	1-1/2	-	-	-	1	-	600	6130	600	6130	0.053	0.003	-	\$ XXXX	6807
Primary Air Duct 68298-48-3000	Int.	1-1/2	-	-	-	1	-	600	6130	600	6130	0.053	0.003	-	\$ XXXX	1292
Tapering Air Duct 68298-48-3000	Int.	1-1/2	-	-	-	1	-	600	6130	600	6130	0.053	0.003	-	(a)	60
Polyester Air Duct 68298-48-3000 Print 68068	Int. & Ext.	1-1/2	-	1/8	1/8	1	-	600	6130	580	6130	0.213	0.420	-	\$ XXXX	3882
Recirculating Air Duct 68142-9-9123	Ext.	1-1/2	-	1/8	-	-	1/8	600	6130	600	6130	0.053	0.003	-	\$ XXXX	238
Box Collector Hoppers Print 68069	Ext.	1-1/2	-	1/8	-	-	1/8	610	6130	600	6130	0.053	0.003	-	\$ XXXX	9479
Induced Draft Fan Print 68068	Ext.	1-1/2	-	1/8	-	-	1/8	600	6130	570	6130	0.053	0.003	-	\$	1277

(a) = Protection only

(a) = Insulate for 70 F differential between air in duct and outside air

(a) = Contractor to furnish information in spaces marked thus

FISHER® POSITROL

FOR ACCURATE
POSITIVE VALVE
POSITIONING

Features

- COMPACT - SIMPLE RUGGED
- 2 YEARS FIELD SERVICE
- EASILY ADJUSTABLE
- FORCE BALANCE TYPE OF POSITIONER
- AVAILABLE WITH OR WITHOUT BY-PASS
- USABLE AS REMOTE POSITION INDICATOR
- FOR DIRECT OR REVERSE ACTION VALVES

Technical Data

TEST	FISHER TYPE 3500	
INSTRUMENT PRESSURE SENSITIVITY CONTROLLING PRESSURE CHANGE NEEDED TO PRODUCE 2 LBS. TO 15 LBS. TO DIAPHRAGM	0.07 LB.	
STEM MOVEMENT SENSITIVITY AMOUNT STEM CHANGE TO PRODUCE 2 LBS. TO 15 LBS. TO DIAPHRAGM	1/2" TRAVEL	0.0037" AVE.
	2" TRAVEL	0.015" AVE.
SPEED TIME IN SECONDS FOR FULL TRAVEL	SIZE	TRAVEL
DD	1/2"	1.2 - 1.2 SEC.
FF	1 1/2"	4.2 TO 4.8 SEC.
GG	2"	7.2 SEC TO 9.6 SEC.
HH	2"	10.5 TO 12.6 SEC.
LAG ERROR IN POSITION AT 9 LBS. CONTROLLER PRESSURE	1/2" TRAVEL	0.0006" AVE.
	2" TRAVEL	0.001" AVE.
EFFECT OF VARIATIONS IN AIR SUPPLY PRESSURE	1/2" TRAVEL	0.1 LB. PER 5 LB. CHANGE
	2" TRAVEL	0.1 LB. PER 5 LB. CHANGE
CHARACTERISTICS CONTROLLED P VS DIAPHRAGM P	LINEAR	
COMMENTS	STABLE ADJUSTMENTS ALL EASY AND SIMPLE	
AIR CONSUMPTION NORMAL 9 LBS. DIAPHRAGM PRESSURE	15.0 CU FT/HR	

FOR COMPLETE DETAILS WRITE FOR BULLETIN E-3500.

Fisher Governor Co., Marshalltown, Iowa

SOUTHERN POWER & INDUSTRY for JANUARY, 1951



Reducing Turbine Maintenance

Good welding technique salvages worn turbine stage at fraction of the replacement cost.

POWER plant maintenance demands the very best in materials and workmanship, and in no phase is this more important than in welding. Poor alloy selection can cause extremely dangerous and costly failures—failures that can imperil personnel and destroy thousands of dollars worth of equipment.

A typical example of what can be accomplished in reducing maintenance by eutectic welding occurred recently in the municipal power plant of a large Southern city. A 20,000 kw turbine was being rebuilt, and it was discovered that the cast iron ring of the ninth stage had been very badly worn away by erosion. It was out of the question to even consider putting this stage back as it was, and either a replacement or repair was necessary.

The engineer in charge of the job

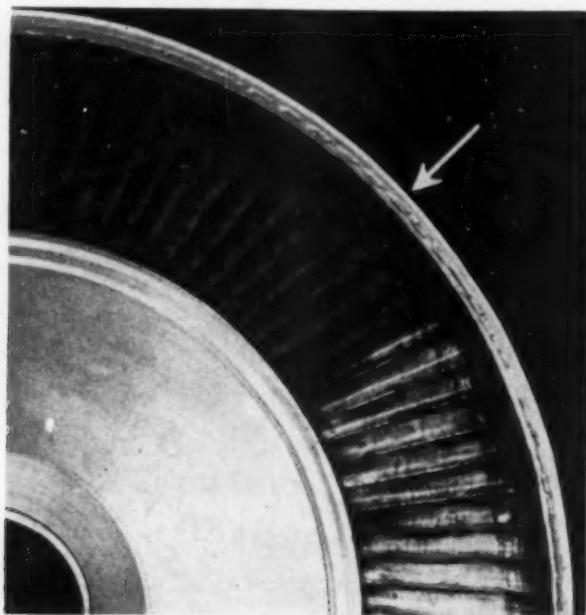
decided in favor of the repair because the amount of time that could be saved and because the cost would be much less. Because of the importance of sound repairs, competitive tests were set up to find the welding alloy that would do the job best. When the tests were completed, it was decided to use EutecTrode 24/49, a product of the Eutectic Welding Alloys Corporation. It can be applied at low amperages and produces sound, machinable deposits without spatter. Most important, this electrode welds at lower heats and the cast iron test sections showed no sign of color during the welding—conclusive proof of the remarkably low heat level at which the alloy bonds.

The ring assembly was carefully mounted in a horizontal boring mill so that all phases of the repair—the preparation, the welding

and the final machining could all be made with one setup. With the ring trued up, .020" was machined off the face of the ring and a $\frac{3}{8}$ " deep undercut with a rounded bottom was made to be certain of a good, clean, welding base and to provide for uniform buildup around the entire circumference. When the machining was completed, the ring was carefully cleaned to remove all oil and dirt and the preparation was finished.

The welder made himself comfortable before he started his work because the boring mill was to be rotated so that he didn't have to move about. An oxy-acetylene torch was used to take the chill out of the cast iron and heat the metal to about 200 F, but no other heating was utilized. Using $\frac{1}{8}$ " EutecTrode 24/49 at 70 amperes on dc, straight polarity, he went to work. Intermittent beads about 1" long and about 8" apart were run on the first pass and each bead was brushed clean. The welder worked around the entire 30° circumference in this way until a complete layer of alloy had been applied. During this entire operation the arc was carried on the weld pool and not on the cast iron so that there would be no danger of base metal fusion. Surface alloying was depended on throughout. A second and a third pass were also made, using progressively longer beads and fusing the previous layer just enough to insure good bonding. At all times, the rate of welding was carefully controlled so that there was no danger of damaging heats building up in the casting.

When the welding was completed, the slight amount of surplus metal was machined off to bring the ring to exact dimensions. The men on the job were amazed at the ease with which the deposits machined and the entire surface was finished without a hitch. After an extremely severe inspection, the ring was pronounced just as good as new without even a measurable amount of distortion. Sixteen pounds of electrode had completely salvaged the turbine stage at a fraction of the cost of a replacement but the time saving was even more important. With just two days of work in the shops, it was ready for reassembly.



It's **VULCAN**

for the **FIRST**

1,370,000

pounds-per-hour boiler

HUDSON AVENUE STATION
CONSOLIDATED EDISON COMPANY
OF NEW YORK

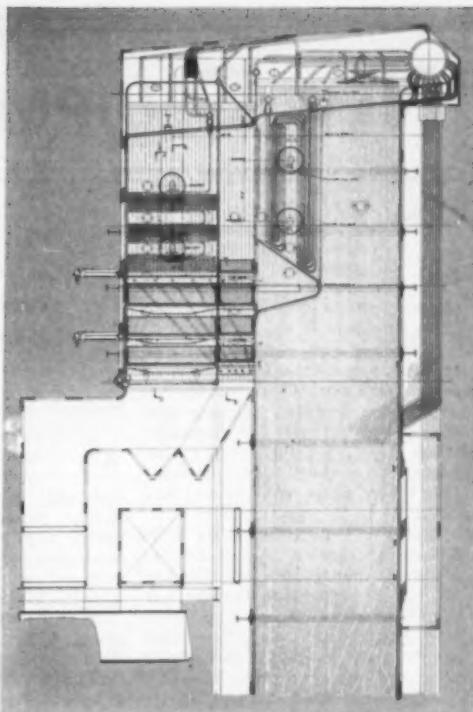
FOR the eighth time, Consolidated Edison Company of New York—world's largest public utility—has purchased Vulcan to keep an important boiler free from soot and slag. This time it's for Hudson Avenue Station, where the world's first 1,370,000-pounds-per-hour boiler is being erected.

The Vulcan Automatic-Sequential Soot Blowing System includes eighteen long retractables and two special air-heater cleaners all air-driven, all to blow with steam.

Whether you prefer to blow with air or steam, depend on Vulcan for optimum cleaning efficiency with low operating and maintenance costs. Let a Vulcan engineer show you how and why.



Showing structural work in progress at Hudson Avenue Station for one of the world's largest boilers.



- B&W Radiant-Type Boiler fired with pulverized coal. Rated at 1,370,000 pounds of steam per hour at 1700 psi and 1050° F.

- 18 Vulcan long retractables, air driven, blow with steam under automatic sequential control.

VULCAN SOOT BLOWER DIVISION

Continental Foundry & Machine Company

DUBOIS, PENNSYLVANIA

VULCAN *Automatic* **Soot** **BLOWERS**

NEW EQUIPMENT for Southern Industry

Coal Scale

A-1 THE RICHARDSON SCALE CO., Clifton, N. J., has announced a new automatic coal scale. New design features include its ability to remain pressure-tight under back pressures up to 60" of water. This feature is said to contribute to combustion efficiency by preventing loss of primary air through the coal scale; help to maintain a clean boiler room; and assure consistently accurate scale performance, even under high back pressures.

The new scale is available with hopper capacities of 400 to 500 lb. Maximum hourly coal capacities are 30 and 40 tons. Inlet opening has been especially designed to keep coal from hanging up. Inside dimensions are 20" x 20". A flapper seal retains fines and assures a clean discharge for each weighing.

The accuracy indicator is at eye-level, and weigh beam is fully accessible.

Trackmobile

A-2 WHITING CORPORATION, Harvey, Ill., has introduced a new device to speed railway car handling. The equipment, known as the Trackmobile, can travel either on the railway track or on

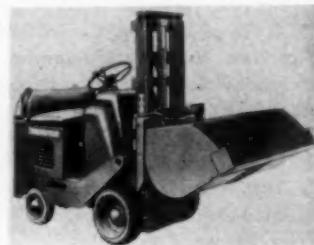
Free additional information is available to readers of Southern Power & Industry. Check item code number on the postage free service coupon post-card provided on p. 17.

Hydraulic Scoop Accessory

A-3 TOWMOTOR CORPORATION, 1226 E. 152nd St., Cleveland 10, Ohio, has introduced a materials handling device which swiftly picks up, transports and dumps bulk materials such as coal, sand, cement, scrap and similar items. Actuated by a two-way hydraulic cylinder, the accessory offers positive, finger-tip control of the angle of the scoop; with the lift truck's mast in vertical position, the hydraulic scoop will tip 45 degrees forward for dumping the load and 30 degrees backward for carrying the load.

Quick-detachable couplings in the hydraulic lines leading to the scoop,

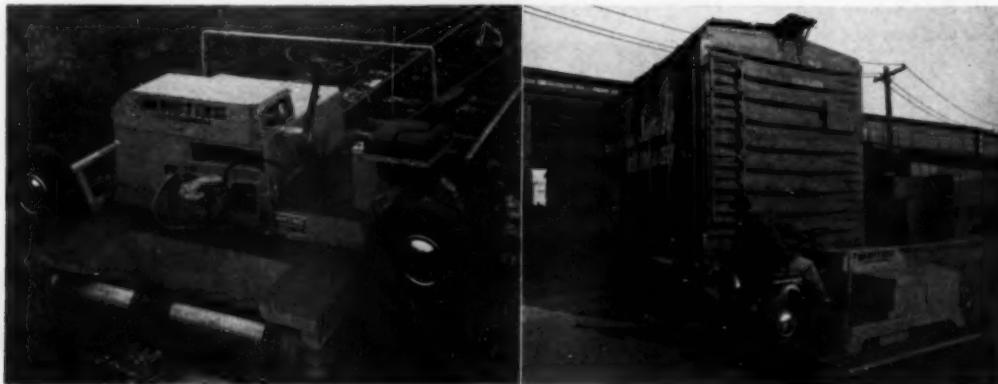
and simplified suspension from the fork support shaft, are said to make the accessory readily interchangeable with standard pallet forks. The only variable dimension on scoops of different capacities is the over-all width.



the ground and can change from one to the other instantly. Hydraulic jacking power is employed to develop adhesive force which gives the vehicle pulling power greater than that of plant locomotives weighing much more than its own 6000 pounds. The unit couples to any standard

railway car. It can handle a hauling, switching or spotting job and then move from track to ground across the yard for another job. The manufacturer recommends its use in industrial plants, railroad car shops, quarries, coal yards, and shipping operations.

6,000 LB TRACKMOBILE EMPLOYS SET OF FOUR STANDARD CONTOUR CAR WHEELS FOR TRACK TRAVEL AND RUBBER WHEELS FOR GROUND TRAVEL, WHICH ARE RETRACTED DURING TRACK OPERATION. CAN CHANGE TO GROUND OPERATION IN 30 SECONDS.



400° F.

350° F.

300° F.

250° F.

FOR EVEN TEMPERATURES

YARWAY

STEAM TRAPS

- Processes requiring careful temperature control call for Yarway Impulse Steam Traps on steam equipment.

The reason . . . Yarway traps maintain even temperatures because they *continually* sample and respond to a trickle of the condensate. There is no arrest in flow, no waiting for large quantities of condensate to accumulate, or trapped steam pockets to condense.

Other reasons why Yarway Impulse Traps have become first choice in many thousands of plants:

- They get equipment hotter, sooner
- Small size, light weight
- Easy to install, easy to maintain
- Only one moving part
- Good for all pressures
- Stainless steel construction
- Low cost

If you are not already familiar with these and other advantages of the Yarway Impulse Steam Trap, try one *for free* and find out for yourself. Call your nearby Yarway distributor, or write to:

YARNALL-WARING COMPANY
Home Office: 116 Mermaid Ave., Philadelphia 18, Pa.

Southern Representative:
ROGER A. MARTIN • Bona Allen Building • Atlanta 3, Ga.

Stainless Steel Body

YARWAY IMPULSE STEAM TRAP

Centrifugal Pumps

A-4 INGERSOLL-RAND COMPANY, Phillipsburg, N. J., has announced a new line of multi-stage centrifugal pumps for high-pressure applications to 1200 psi and capacities to 1600 gpm. The new models are built in 3, 4, 5, and 6 inch sizes with from 3 to 9 stages. Applications cover a wide range of boiler-feed, pipe-line pumping, and refinery as well as other general industrial services.



The features of this new design are its cylindrical-bore, horizontally split casing, and compact unit type rotor assembly. The rotor assembly is composed of the shaft, impellers, and channel rings. These channel ring sections contain the multiple volutes and fluid passages, with renewable wearing parts for each stage.

Industrial Hoist

A-5 THE YALE & TOWNE MANUFACTURING CO., Philadelphia Division, 11000 Roosevelt Blvd., Philadelphia 15, Pa., has announced a new link chain model Pul-Lift, a portable device for hoisting or pulling. Applications include maintenance and production jobs in industrial plants, construction projects, utilities, refineries, quarries, and ma-



Bonding Agent

A-6 CARL H. BIGGS CO., 11616 West Pico Blvd., W. Los Angeles, Calif., has added to its line an anhydrous thermosetting sealant compound for industrial use known as Bonding Agent R-313.

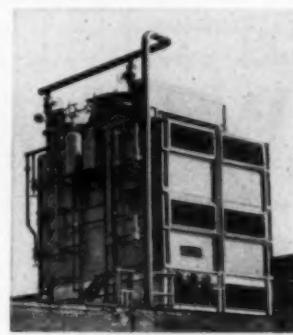
The product is applicable for manually bonding dissimilar and similar materials such as glass, plastics, Neoprene, leather, etc., to metals of all types. It is also useful for bonding ferrous metals to non-ferrous metals, such as iron, brass and bronze to aluminum or magnesium; or aluminum to aluminum.

The new thermosetting compound cures without heat, but if time is pressing, it can be cured in a short time by baking at low temperature. Clamps are not necessary to hold parts together during either fast or slow curing processes.

R-313 is said to be chemically inert to concentrated acids and alkalies at room temperature. The manufacturer states that it has excellent electrical properties, with a compressive strength of 14,000 psi, flexural strength of 7000 psi and shear strength of 2500 psi.

High Capacity Condenser

A-7 NIAGARA BLOWER COMPANY, 405 Lexington Ave., New York, N. Y., is producing a new high capacity Aeropass Condenser built to serve large refrigeration plants. Its nominal rating is 300 tons. Design features include the company's patented pre-cooling coil and oil separator.



In spite of the high capacity provided, the equipment is compact, measuring 14' x 13' in length and breadth and 18' in height. Weight is approximately 20 tons. It may be installed either on a roof or on the ground.

Recommended application is to refrigeration plants above 400 tons refrigerating so that that the operator may obtain the economy that a multiple unit installation gives by varying condensing capacity with the actual refrigeration load.

Portable Welder

A-8 GENERAL ELECTRIC COMPANY, Schenectady 5, N. Y., has announced a new silicone-insulated, portable, a-c welder, equipped with automatic control. The silicone insulation is unaffected by high temperatures and is water repellent.

Instant arc striking without any manual adjustment is provided by "Hot Start" automatic control. The correct amount of boost is furnished for any specific current setting. The ampere range is covered by three overlapping current ranges which permit precise current control.

Compact construction—17" in diameter, and 35" in height—permits utilization of underbench space not available to larger welding units. The equipment can be used for welding light or heavy materials. It is mounted on a running gear for portability.

BOILERS DON'T NEED STEEL CASINGS

**B-L's TEXAD* replaces plate,
improves furnace efficiency**

**Eases steel
requirements**

- TEXAD* eliminates the nuisance of steel plate casings for boilers and other industrial furnaces. As a result, steel quotas can now be devoted solely to pressure parts. TEXAD*—a canvas sheathing impregnated with a specially developed heat-resistant adhesive—is applied directly to the insulation surface, hung just like wallpaper.

**Improves
air tightness**

- The canvas and adhesive finish provides a completely air-tight furnace. Because of its flexible sheathing, TEXAD* prevents shrinkage cracks in the finish coat of insulating cement and acts as a safeguard against air leakage.

**Cuts material,
labor costs**

- The material and labor expense of installing steel casings is greatly reduced by TEXAD*. Some of the resulting savings can be used to secure sounder construction back of tubes for a more balanced furnace design. The net result is a better enclosure—at a much lower cost.

**Provides complete
weatherproofing**

- Because TEXAD* enclosures are completely waterproof, outdoor installations are not affected by rain, snow or sleet. Indoor installations can be washed down at any time. Final jobs can be painted any color, or left white.

*TRADE MARK

A new folder describing TEXAD* has just come off the press. Write today for your copy—no obligation, of course.

**BIGELOW
LIPTAK**
Corporation

BIGELOW-LIPTAK

Unit-Suspended Walls + Arches

CURTIS BUILDING • DETROIT 2, MICHIGAN

IN CANADA

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Heat Exchanger

MARTIN-QUAID Co., 1878 Sedgley Ave., Philadelphia 32, Pa., has announced a new design of heat exchanger which provides corrosion resistance at a comparatively low cost. Corrosion resistant materials are used only where required—as flange inserts and for the inner tube which contacts the fluid or vapor being heated.

The model, known as the Econalloy, is said to save space because it forms an integral part of the piping system. It can be supported vertically or horizontally along a wall, or on hangers. The heat exchangers are said to be easily demounted for cleaning, and additional capacity can be added as needed.

The line is furnished in sizes from a fraction of a sq ft of heating surface to several hundred sq ft in lengths up to 30 ft per segment. Internal tube sizes range from $\frac{1}{4}$ " to 4". Standard units are available for pressures up to 900 psi and temperatures in excess of 700 F.

Gaskets

CHICAGO GASKET COMPANY, 1275 W. North Ave., Chicago 22, Ill., has introduced a new line of gaskets fabricated from a heavy duty Du Pont plastic, known as "Teflon". The product is adaptable

for use in processing chemicals, foods, pharmaceuticals, leather, paper, paint, and petroleum, because of the unusual characteristics of the material.

The new gaskets are said to have chemical resistance, heat resistance, and are said to be tough and durable. Available in hard, medium, and soft grades, they are suitable for all metal and non-metallic flanges, and are produced in sizes from $\frac{1}{2}$ " to 6" ID inclusive for ASA or special flanges.

FREE READER SERVICE

To obtain free information on this equipment, circle number on the page 17 free post card.

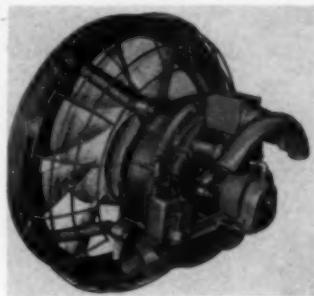
Turbine Blowers

L. J. WING CO., Linden, N. J., has announced a line of turbine blowers with Wing all-steel turbines, suitable for steam conditions up to 600 psig and 750 degrees total temperature.

The blowers have been modernized with fan impellers of airfoil design and streamlined air entry, for high efficiency and quiet operation. No water cooling is required since bearings and lubrication system are automatically air cooled.

For oil burner applications they can be bolted directly to the front

windbox without additional supports. They can be furnished for vertical down discharge, or for cementing



into boiler brick work. They are useful for capacity regulation through speed variation. The units are also available with voltrol vanes and constant speed governors for damper regulation. Capacities are to 70,000 cfm or statics to 20" H₂O.

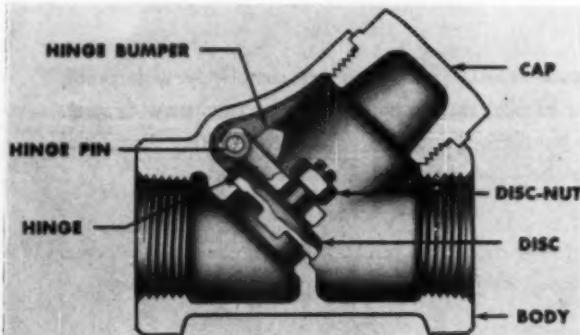
Boiler Blow-Off Valves

EVERLASTING VALVE COMPANY, Dept. 45, 49 Fisk St., Jersey City, N. J. has added a straightway "Y" type valve to its line of boiler blow-off valves.

The head, or disc, is made of "H" monel metal and the seat of monel metal, to withstand the erosive and corrosive conditions to which a slow opening blow-off valve is subjected. The renewable seat is provided with upper and lower sealing gaskets to protect the seat threads from corrosion.

The stem is made of stainless steel and the stem nut is bronze. All parts are renewable without the use of special tools.

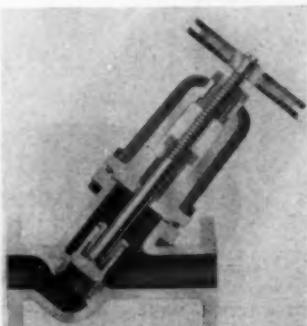
The valves are offered in $1\frac{1}{2}$ ", 2" and $2\frac{1}{2}$ " sizes, in cast iron or cast steel, for pressures up to and including 600 lb.



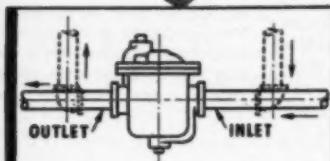
Swing Check Valves

CRANE COMPANY, 836 S. Michigan Ave., Chicago 5, Ill., has announced a new line of Y-pattern brass swing check valves of the regrinding type and in the 200 and 300-pound pressure classes. Screwed end patterns are available in sizes $\frac{1}{4}$ to 3-inch, inclusive; flanged end patterns in sizes 1 to 3-inch, inclusive.

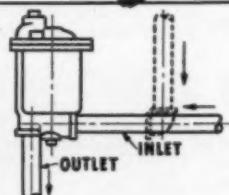
A large cap opening on the same center line as the seat opening permits easy access for regrinding and replacement of parts. Easy contours in the Y-pattern body are said to offer minimum resistance to flow. The new check valves can be used on lines where flow is horizontal or upward. They should be installed with the inlet under the seat, as indicated by an arrow cast on the body.



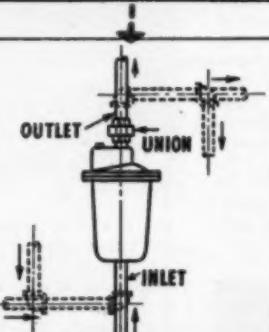
YOU SAVE
TIME AND MONEY



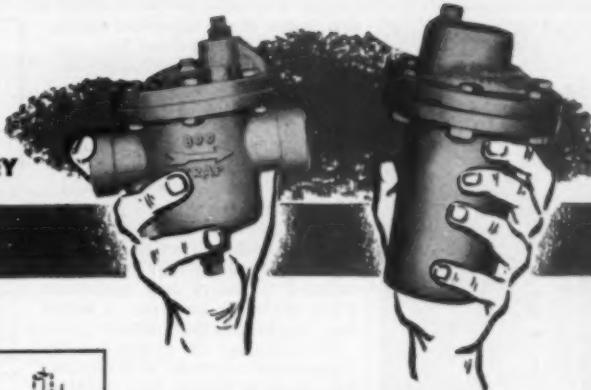
Connections for No. 800-813 side inlet-side outlet traps. Available in $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1" sizes for pressures to 250 psi.



Side inlet-bottom outlet trap, $\frac{1}{2}$ " or $\frac{3}{4}$ ". Greatly simplifies connections to many types of small steam-consuming units.



Bottom inlet-top outlet body style. $\frac{1}{2}$ " through 2" connections. Cast semi-steel bodies for pressures to 250 psi. Forged steel bodies for pressures to 1500 psi.



**"This choice of
Steam Trap Body Styles
simplifies
installations"**

IN THE most widely used sizes, Armstrong Steam Traps are available in either side inlet-side outlet or bottom inlet-top outlet body styles. This gives the user an opportunity to make exceptionally neat installations with a minimum of fittings and a minimum of labor and permits correct location of the trap in relation to the unit being drained.

In both styles the entire interior mechanism may be taken out for inspection or repair simply by removing the cap. The body, full of boiling water, is left in the line. In the case of the side inlet trap the cap may be removed without even disturbing the pipe connections.

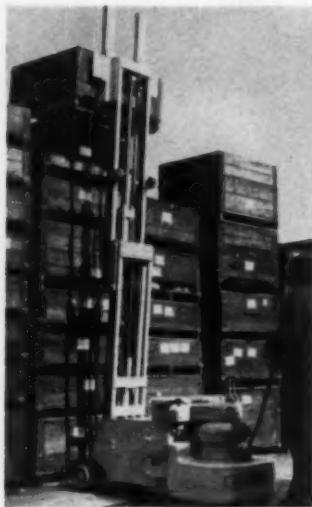
Ask your nearby Armstrong representative to show you the opportunities for simplifying trap installations.

ARMSTRONG MACHINE WORKS
806 Maple St., Three Rivers, Mich.

THE 36-PAGE ARMSTRONG STEAM TRAP BOOK gives data and prices on the complete line of Armstrong steam traps for every pressure, every application. This book is a valuable reference for the calculation of condensate loads and the selection of traps for all classes of equipment. Send for free copy today



ARMSTRONG STEAM TRAPS



Stackers

A-14 AUTOMATIC TRANSPORTATION COMPANY, 149 West 87th St., Chicago, Ill., has announced the addition of 11 inches of lift to its tilting telescopic Transtacker. The

unit is one of six driver-led electric stackers, of the suspended fork type, recently added to the company's line. All incorporate the new power unit and exterior characteristics of the series.

The tilting and telescopic unit is accompanied by a non-telescopic unit which is designed for use where neither tilt nor telescopic lift are required. These are rated for 2,000-pound, 48-inch long loads.

Three similar models have been designed for heavy duty operations. These are rated for loads 48 inches long weighing 2,500 pounds.

The increased lift means that the Transtacker now tiers to 131 inches. The truck is shorter than previous models by five and one-half inches and lighter by 650 pounds.

High-Pressure Gasket

A-16 FLEXITALIC GASKET CO., 8th and Bailey Sts., Camden 2, N. J., is producing a new high-pressure gasket designed to streamline jointed connections, reduce turbulence in the piping, and increase flow of fluid.

Electronic Master Control System

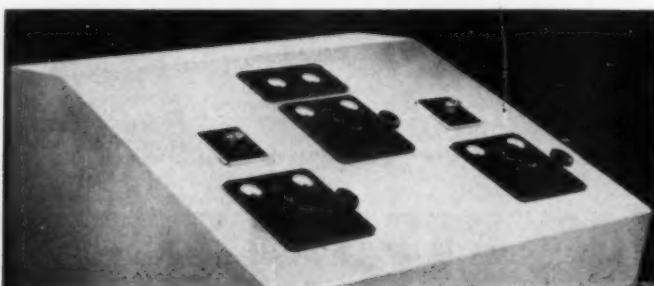
A-15 REPUBLIC FLOW METERS CO., 2240 Diversey Parkway, Chicago 47, Illinois, announces their new Telemaster, an electronically operated master control system for combustion and process control applications. Unit will remotely reproduce, instantly and accurately, a position or a force—perform arithmetical and algebraic calculations—and can be used for multiple operations. Essentially it performs the function of a mechanical link through electrical and electronic means.

No control panel piping is necessary with the unit. Easily installed, multi-wire cables are the only con-

nection between the Telemaster benchboard and the plant measuring and control elements. System may be operated under completely automatic, semi-automatic, or manual control from a central supervisory station.

Unit offers complete freedom of control centralization, simplified and smaller control panels, elimination of transmission lags, no panel piping, greater application flexibility, and reduced maintenance. System may be operated under completely automatic, semi-automatic, or manual control from a central supervisory station.

For full operating details in the manufacturer's Bulletin 1100 circle the above code number on the page 17 service coupon post card.



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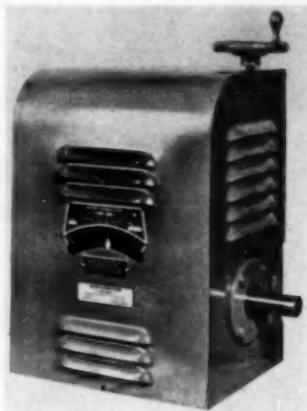
To obtain free information on this equipment, circle number on the page 17 free post card.

The new gasket is a compression gauge type with both an inside and outside ring. It has a spiral-wound construction with alternating V-crimped plies of metal and filler.

The new model is made for practically all standard A.S.A. and A.P.I. fittings as well as special designs. Pressure range is 150 to 2500 lb. In addition to stainless steels, the inside ring can be made with other metals such as monel, nickel or inconel.

Variable Speed Drives

A-17 WORRINGTON PUMP AND MACHINERY CORPORATION, Harrison, N. J., has announced a new variable speed transmission series, incorporating the company's tandem belt design.



The new line, known as the All-speed Drive, consists of six models, rated at 1, 3, 5, 7½, 10 and 15 hp. Variations of 16 to 1, 10 to 1, 9 to 1, 8 to 1, 6 to 1, and 6 to 1, respectively, are offered. At 1725 rpm input, the 1 hp unit offers a range of 215 to 3450 rpm; the 15 hp unit varies from 370 to 2220 rpm with an input speed of 1750 rpm.

The new design is particularly suited to applications where space limitations require extreme compactness and upon advance specification units can be furnished for vertical or horizontal operation, to run in either direction.

MODERN STEAM GENERATING UNITS

any size . . . any pressure
any temperature . . . and for any fuel

SPRINGFIELD BOILER CO. specializes in the production of modern steam generating equipment . . . ANY SIZE . . . ANY PRESSURE . . . ANY TEMPERATURE . . . AND FOR ANY FUEL. Springfield is organized to apply the same engineering skill to all contracts, large or small. This is one of the reasons why Springfield is the choice of an increasing number of power engineers interested in having careful attention given to their jobs. Springfield service includes design, fabrication, erection and placing in operation of the complete unit. We will be glad to submit a proposal covering your requirements.

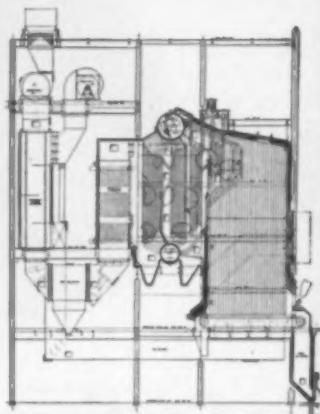
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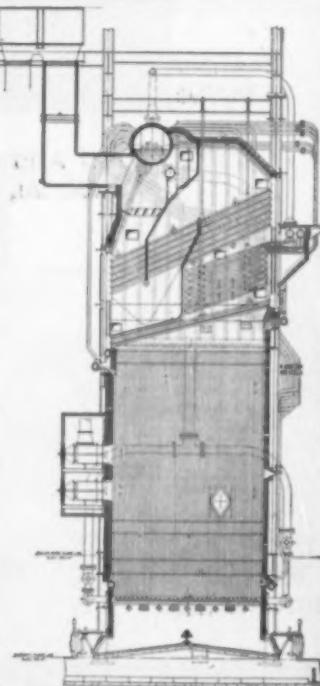
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ECONOMIZERS • WATERWALLS • PACKAGE BOILERS • COMPLETE STEAM GENERATING UNITS

Check with your Consulting Engineer on Modernization and New Plant Projects



ELK RIVER STEAM PLANT, ELK RIVER, MINN.—120,000 lb. Springfield two drum, bent tube steam generator complete with water cooled furnace, air heater, economizer, forced and induced draft equipment, instruments and controls. Operating pressure, 615 p.s.i.; 830° F. controlled total steam temperature at superheater outlet.

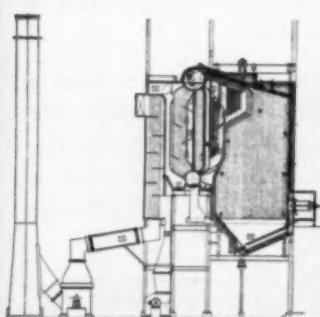
Ralph D. Thomas and Associates, Inc.
Consulting Engineers, Minneapolis, Minnesota



CITY OF COLORADO SPRINGS, COLO.—A 150,000 lb. Springfield bent tube, two drum steam generator complete with water cooled steam generator, air heater, forced and induced draft equipment, 410 p.s.i. pressure, 750° F. total steam temperature at superheater outlet. Gas or oil firing with future provision for pulverized coal.

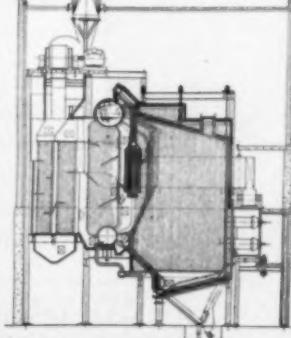
Lutz & May, Consulting Engineers,
Kansas City, Missouri

IOWA ELECTRIC LIGHT & POWER CO., CEDAR RAPIDS, IOWA—300,000 lb. Springfield installation (4 units). This design features Springfield's exclusive center water wall (divided furnace) type of construction. 750 p.s.i. design pressure. 750° F. total steam temperature at superheater outlet at 760 p.s.i. operating pressure with pulverized coal firing.



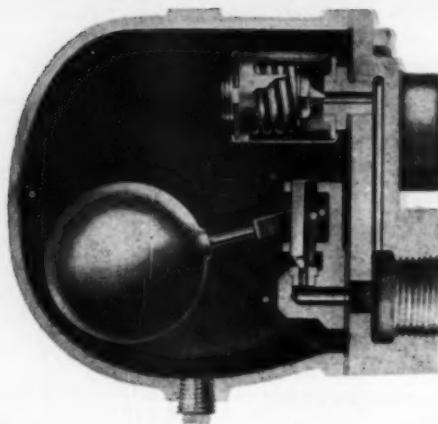
CHARTER OAK STEAM PLANT, BELTON, TEXAS—A modern, two-drum 130,000 lb. Springfield steam generator (2 units) complete with water cooled furnace, superheater, air heater, forced and induced draft equipment, 630 p.s.i. pressure, 825° F. total steam temperature at superheater outlet. Firing with gas and oil.

Karamore & Douglass, Inc. Consulting Engineers,
Chicago, Illinois



IOWA ELECTRIC LIGHT & POWER CO., CEDAR RAPIDS, IOWA—300,000 lb. Springfield installation (4 units). This design features Springfield's exclusive center water wall (divided furnace) type of construction. 750 p.s.i. design pressure. 750° F. total steam temperature at superheater outlet at 760 p.s.i. operating pressure with pulverized coal firing.

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SWEETS



SARCO

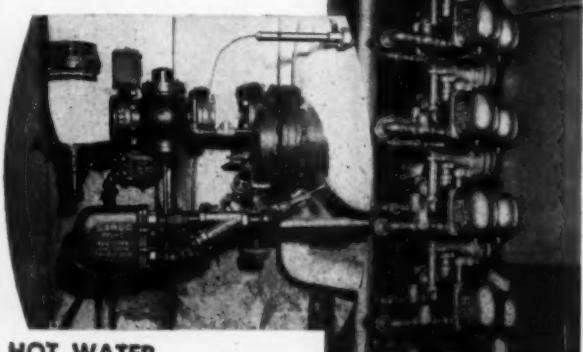
FLOAT-THERMOSTATIC STEAM TRAP

For Continuous Condensate Removal

HEATING
MAINS



FOOD AND
CHEMICAL



Here is the trap that is used by the thousands for heating coils, mains and continuous process operations. The built-in automatic thermostatic by-pass takes care of all air and gases without steam waste.

The top illustration shows a bank of Sarco FT traps dripping the ends of mains in a large office building. At the left is shown a typical installation. In the soap and food industries, in two Chicago plants, a few Sarco FT's made a million dollars worth of equipment operative where three other types of traps had failed.

The controlled hot water hook-up at the lower left is another example. The ball float in the FT trap allows continuous discharge without shock to temperature controls. Ask for Catalog No. 450.

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SAVES STEAM

IMPROVES PRODUCT QUALITY AND OUTPUT

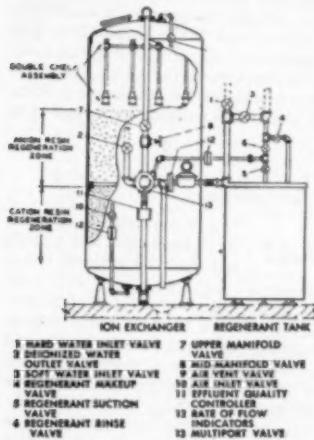
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316

Tank Deionizer

A-18 ELGIN SOFTENER CORPORATION, Elgin, Ill., has developed a single tank deionizer for use where the cost of evaporated or distilled water is prohibitive. The manufacturer states that in addition to producing high quality, mineral-free water, this deionizer will also completely remove silica and CO₂.



from water—an essential requisite for steam generation, especially for boilers of high pressure type.

Two types of resinous zeolite exchangers are used in the deionizer; one for the positively charged ions

(cations) and one for the negatively charged ions (anions). The cation exchanger is regenerated by a dilute acid solution; the anion exchanger by a caustic solution. Instead of requiring separate exchanger tanks for each exchanger as in former deionizing equipment, the two exchangers are intermixed in a single tank. These exchangers have a marked difference in density which permits them to be divided by backwash into two zones for separate regeneration. Each regenerant solution is introduced into its proper zone. Thus, in this simplified equipment, water is deionized, the zeolite mixture separated into its components, the two resins regenerated, remixed and again returned to the deionizing cycle. Simple manipulation of a multiport valve and supplementary controls accomplish backwashing; regeneration; mixing the zeolites; return to service.

FREE READER SERVICE

To obtain free information on this equipment, circle number on the page 17 free post card.

Simple thumb pressure on the center plate-button starts the process; and release of this pressure stops the action instantly. Thus, the moving tape is under control at all times, and only one hand is required for operation. Weight is 23 ounces. The tape retails for \$12.00.

Bucket Elevator

A-20 BEAUMONT BIRCH COMPANY, 1505 Race St., Philadelphia 2, Pa., is producing buckets

cast integrally with a single link of chain so that they cannot loosen and fall off. The new models, known as "Uni-Cast" buckets, have no raised surfaces or projecting bolt heads on the inside to retard discharge of material. The buckets are made of a heat-treated alloy steel for durability. The front edges and corners are reinforced to withstand severe abrasive action while loading. The bottom of the bucket is flat to prevent arching. Sizes available are 8" x 5", 10" x 6", 12" x 7", 14" x 7" and 16" x 8". Other sizes can be furnished to meet requirements.

Steel-Tape Rule

A-19 MASTER RULE MANUFACTURING COMPANY, INC., Middle-town, N. Y., is marketing a new 50-foot steel-tape rule which re-winds itself automatically, and is useful for industrial maintenance and plant operating men, shippers, and materials handlers. The manufacturer states that it takes but 10 seconds to rewind the full 50 feet.

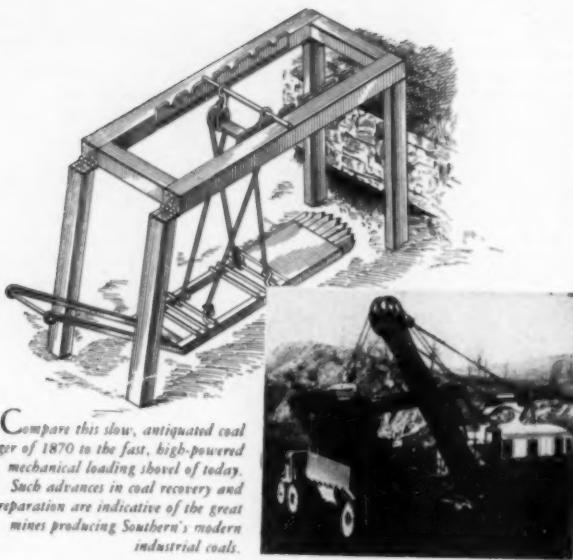
Reynolds Metals' Jones Mills Reduction Plant

Reynolds Metals Company's plant at Jones Mills, Arkansas produces aluminum pig by the Hall electrolytic reduction process. With a rated capacity of 144 million pounds of aluminum yearly, this plant has one of the world's largest engine-generator plants producing almost 2 million kilowatt-hours of electricity daily. The huge generating

facilities are supplemented by electric power from the new Lake Catherine Steam Plant of the Arkansas Power & Light Co.

Copies of a new booklet describing the Jones Mills Plant are available without charge upon request to the Reynolds Metals Company, 2000 South Ninth St., Louisville 1, Ky.





Compare this slow, antiquated coal digger of 1870 to the fast, high-powered mechanical loading shovel of today. Such advances in coal recovery and preparation are indicative of the great mines producing Southern's modern industrial coals.

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tech-nol' o-gy—Industrial science; applied science contrasted with pure science.

Mr. Webster's definition describes concisely the mission of Southern's coal engineers. Like the modern mining technology employed to produce our precision-sized, washed industrial coals, Southern's engineers make *practical application* of the right coal for specific types of burning equipment.

Here is Southern's factual approach to more economical coal utilization: Our engineers 1 Make complete plant surveys; 2 Recommend coal best suited for burning equipment; 3 Conduct actual burning tests; 4 Chart final results.

Similar to the experience of an ever increasing number of plants, you also can find the *real* answer to lower costs through Southern's Coal Technology. Call, wire or write our nearest office today!

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Southern offers industrial buyers a wide variety of premium coals from the coal fields of Western Kentucky, West Virginia, Virginia, Eastern Kentucky, Illinois, Alabama, Arkansas, and Oklahoma. *One is right for your plant!*

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Sinclair Coal Company, Kansas City 6, Mo.—Western Representative
Boon-Strachan Coal Company, Ltd., Montreal—Canadian Representative

Aluminum Solder Flux

A-21 ALL-STEEL WELDING ALLOYS CO., INC., 273 Ferris Ave., White Plains, N. Y., is marketing an aluminum solder flux that can be reactivated after drying out by the simple addition of tap water.

This new flux, according to the manufacturer, can be used with aluminum solder rods of any brand; can be used with an open flame; and under certain conditions with a soldering iron. It will make solder flow into the joint to increase sealing and pressure-tightness of the solder. The product, known as No. 39 Brazaloy Flux, is available in drums, cans, and jars.

Draft Inducer

A-22 L. J. WING MFG. CO., Linden, N. J., has announced a draft inducer with integral barometric for the more precise control of furnace draft. The inducers are now equipped with variable speed motors and can be equipped with integral barometric dampers, the combination of which is said to permit the operator to achieve high combustion efficiency. An important feature is a hinged explosion gate to relieve any excessive pressures that may develop in the breeching, thus preventing damage to the heating system.

Diesel Engines

A-23 THE DETROIT DIESEL ENGINE DIVISION OF GENERAL MOTORS CORP., 13400 West Outer Drive, Detroit 28, Mich., has announced a new option on Diesel engines which enables them to burn natural gas. The option is available both on new engines leaving the factory and engines already in use. For the latter a factory-engineered kit is available for the changeover.

The changeover permits the engines to burn either natural gas with a pilot charge of Diesel fuel or Diesel fuel alone. There is no interference with the operation of the unit as a straight Diesel fuel engine when required.

Steam-Jet Cleaner

A-24 LIVINGSTONE ENGINEERING CO., 100 Grove St., Worcester 5, Mass., has announced a new, smaller steam-jet cleaner in a lower priced all-electric, portable unit only 16" wide and 40" long.

The new model uses steam from the built-in high pressure Speedyloc-

FREE

From Western Precipitation—the organization that pioneered the commercial application of Cottrell Precipitation...

IF YOU ARE ENGAGED in any phase of industry where the recovery of dusts, fumes, fly ash, mists, fogs or other suspensions from gases is a problem, you will find this booklet on the **COTTRELL** Electrical Precipitator helpful and informative.

Western Precipitation pioneered and installed the first commercial application of the well-known **COTTRELL** Electric Precipitator—Dr. Cottrell, the inventor, being a member of the company. And for more than 42 years Western Precipitation has consistently led in developing new **COTTRELL** advancements and techniques for recovering suspensions from gases, both wet and dry.

This 28 page booklet summarizes many of the basic facts you should know about modern **COTTRELL** Precipitators—the various types available, how they operate, principal types of electrode systems and rectifiers, shell constructions, etc. As long as the supply lasts, a free copy will be sent you on request to our nearest office. Ask for Bulletin No. C 103.

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of helpful facts to
know about
COTTRELL
ELECTRICAL
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Packed with helpful **COTTRELL** Information!

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- Basic types of Cottrell Electric Precipitators.
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- Mechanical and Electronic Rectifiers.
- Various types of Collecting Electrodes (red curtains, corrugated plates, dual plates, pocket electrodes, etc.).
- Removal of Collected Material.
- Factors in Shell Construction (steel, concrete, brick, etc.).
- Operating Efficiencies and the Effect of Various Factors on Performance.

... and many other basic Cottrell facts. Write for your free copy of Bulletin C103 today while supplies are adequate!

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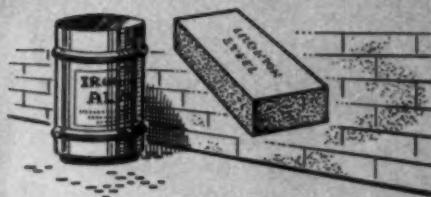
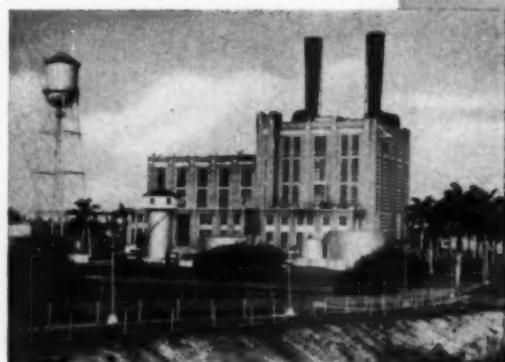
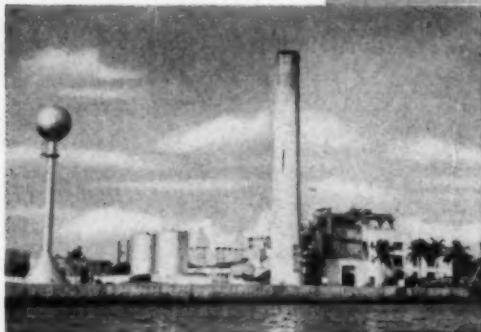
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"IRONTON ALSET" is the perfect bonding mortar for "Ironton Steel" brick. This air-setting high temperature cement is made to form a joint actually stronger and more refractory than the brickwork. It seals against gas and air. It works easily as mortar, dip, or spray. Ironton representatives in the South can tell you more. Call the nearest one listed below.

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ASK FOR INFORMATION ON:
 "Ironton Mulcrete" — Castable Refractory
 "Ironton Nojoint" — Plastic Refractory
 "Ironton Refcoat" — Coating Material
 "Ironton Baffle Cast" — Castable for
 Boiler Baffles
 "Ironton" Special Shapes

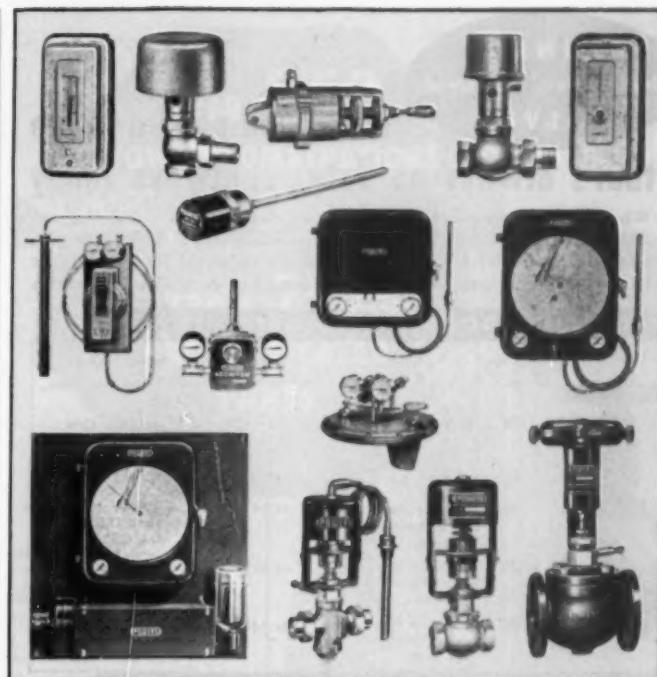
tric boiler. Small quantities of solvents are used economically for they are not diluted by mixing with gallons of water at the jet. Dirt, grease, oil and caked-on accumulations are said to melt away before the high velocity jet of hot dry steam and solvents applied instantly as needed under push button control of the operator.

Separators

A-25 THE SWARTWOUT COMPANY, 18511 Euclid Ave., Cleveland 12, Ohio, has announced a complete line of separators for cleaning compressed air by means of centrifugal force. Known as the Airfuge, the separator is available in inlet and outlet tapping sizes from $\frac{1}{2}$ inch to $2\frac{1}{2}$ inches.

According to the manufacturer, the unit removes 99 per cent of all impurities from compressed air without pressure drop. Moisture, oil, scale and other solids in the air are whirled outward to the walls of the unit where they drain down to the trap section. At the same time the clean, dry air passes unimpeded to feed line or tool, operating the equipment without danger of corrosion, wear, clogging, fire, explosion or freezing which occur in contaminated air.

A float-operated trap automatically releases accumulated liquids as they rise to a level above that necessary to effect a seal. Drain valve outlet is tapered to prevent stoppage by particles of scale, etc.



For STABILIZED Heat and Humidity

POWERS

Pneumatic TEMPERATURE and HUMIDITY Control

- ★ Often Cuts Fuel Consumption 15 to 25%
- ★ Increases Output ★ Improves Quality of Workers

Prevent OVER-heating, save fuel, increase comfort and efficiency of people in heated rooms with a Powers pneumatic system of temperature control. A sound, highly profitable investment for heated and air conditioned buildings.

Constant temperature and humidity conditions in each room can be maintained at any predetermined point with a POWERS system of pneumatic control.

Phone or write your nearest Powers office for an engineer to call and study your requirements for better temperature control. An estimate entails no obligation.

THE POWERS REGULATOR CO.

Established 1891 • OFFICES IN OVER 30 CITIES • See Your Phone Book

CHICAGO 14, ILL., 2720 Greenview Ave. • NEW YORK 17, N.Y., 231 E. 46th St.

LOS ANGELES 5, CAL., 1808 West 8th St. • TORONTO, ONT., 195 Spadina Ave.

142 Spring St., N.W., Atlanta, Ga.

(HAG)



KENNEDY

Underwriters' Approved
VALVES

When you need a Valve that's always on duty... always ready

Whenever life and property are at stake, the complete reliability and dependability that are built into every KENNEDY Valve are plus safety features. The valves listed below are approved by Underwriter Laboratories and Associated Factory Mutual Fire Insurance Companies.

IRON BODY DOUBLE-DISC GATE VALVES



Fig. No.	Type	Size	Working Pressures
67	O.S. & Y. Screwed	2½" to 12"	Cold Water, non-shock, 175 lbs.
68	O.S. & Y. Flanged	2½" to 14"	2½" to 12"—Cold Water, non-shock, 175 lbs.; 14"—150 lbs.
681	O.S. & Y. Bell Ends	4" and 6" to 14"	Some as Fig. 68
701	Indicator Post Gate Valve—Flanged	4" to 14"	4" to 12"—Cold Water, non-shock, 175 lbs.; 14"—150 lbs.
702	Indicator Post Gate Valve—Screwed	4" to 12"	Cold Water, non-shock, 175 lbs.
70	Indicator Post Gate Valve—Bell Ends	4" to 14"	Some as Fig. 701

BRONZE VALVES



66	O.S. & Y. Wedge-Disc Gate Valve	¾" to 2"	Cold Water, 175 lbs.
38	Hose Gate Valve no cap and chain	2½"	Cold Water, 175 lbs.
39	Hose Gate Valve with cap and chain	2½"	Cold Water, 175 lbs.
93	Angle Hose Valve	2½"	Cold Water, 175 lbs.
933	Angle Hose Valve	2½"	Cold Water, 300 lbs.

IRON BODY CHECK VALVES



125	Screwed Check Valve	4" to 6"	Cold Water, non-shock, 175 lbs.
126	Flanged Check Valve	4" to 12"	Same as Fig. 125
127A	Bell-end Check Valve	4" and 6" to 12"	Same as Fig. 125

INDICATOR POSTS

128	Indicator Post	4" to 12"	Cold Water, non-shock, 175 lbs.
129	Indicator Post	4" to 12"	Same as Fig. 128
129A	Indicator Post	4" to 12"	Same as Fig. 128

Write for full particulars

Buy from Your Local Distributor



THE
KENNEDY

VALVE MFG. CO.
106 EAST WATER ST.
ELMIRA, NEW YORK

VALVES • PIPE FITTINGS • FIRE HYDRANTS

OFFICE-WAREHOUSES IN NEW YORK, CHICAGO, SAN FRANCISCO • SALES REPRESENTATIVES IN PRINCIPAL CITIES

Industrial Oil Burner

A-26 IRON FIREMAN, 1305 S. W. 12th Ave., Portland 1, Oregon, has announced a newly designed industrial oil burner of the horizontal, rotary atomizing type which burns No. 6 oil or lighter. The units are available in nominal ratings of 9, 16, 25, 35, 50 and 60 gallons per hour and are equipped with a meter which allows use of grades of oil with varying viscosities without change of adjustment. They may be used for all types of high or low pressure boilers and for many industrial applications.

This new industrial burner has a gear-type circulating pump, which runs at low speed, maintaining a constant supply of oil in the reservoir. The unit is powered by a V-belt drive and standard 1750 rpm motor.

◆

Air Conditioning Control

A-27 MINNEAPOLIS - HONEYWELL REGULATOR CO., BROWN INSTRUMENTS DIVISION, Wayne & Roberts Aves., Philadelphia 44, Pa., has developed an electronic hygrometer for measuring and controlling industrial air conditioning.

The system includes a single-point recorder of a circular or strip chart type, with or without control and a small element which does away with the use of human hair. The element uses gold leaf and a chemical salt solution that eliminates cleaning and other maintenance.

The system is said to provide for direct humidity reading without assistance of psychrometric charts; it uses sensing changes between the limits of 20 and 93 per cent relative humidity; it has a minimum span of 20 per cent relative humidity throughout its 20 to 93 per cent range, and all ranges with full temperature compensation between the limits of 50 and 120 F are available.

◆

Portable Winch-Hoist

A-28 THE LUG ALL COMPANY, 331 East Lancaster Ave., Wynnewood, Pa., has developed a new 1½ ton alloy winch-hoist which offers new and useful features.



With a 30 to 1 power ratio and tested to a 100 per cent overload, weight of the hoist is held to 8½ pounds by design. Standard features include pre-formed flexible aircraft cable, stainless steel fittings and springs, and oiled for life bearings. The handle is reversible and acts as

OVER 250
TOWER COMBINATIONS

FROM 258
PREFABRICATED
PARTS

why Fluor can give you
THE RIGHT TOWER...
AT THE RIGHT TIME...
AT LESS ERECTION COST

Whatever your cooling problem—process, gas or liquid—Fluor has the cell size and height to meet flexibility and operating requirements. From only 258 standard interchangeable prefabricated parts, over 250 different tower sizes and arrangements are possible—the result of over 30 years' experience in the design and manufacture of cooling towers to solve virtually every cooling problem in industries utilizing water as a cooling medium.

Fluor is the largest manufacturer of prefabricated cooling tower parts in the world—Here's what this means to you . . .

THE RIGHT TOWER, guaranteed to meet your specified requirements. The octagonal shape, true counter-flow design and "Spirodome" up spray distribution system of a Fluor Counterflow Cooling Tower offer greater cooling capacity per square foot of ground area than any other type tower available!

AT THE RIGHT TIME means just that. From an in-stock supply of prefabricated parts, the tower meeting specified requirements can be "packaged" for immediate shipment. Your tower delivered this way gets fast freight handling and erection upon arrival.

AT LESS ERECTION COST because all parts are marked for fast erection. There's no need for trial-and-error or cut-and-fit erection methods. Another saving is realized by the elimination of scaffolding. Extra heavy grid decking supported on 2" x 4" cross bracing—a feature of all Fluor Counterflow Cooling Towers—form the only scaffolding necessary for continuous erection.

FOR YOUR
FILES

"Cooling Tower
Studies"

"Cooling Tower
Maintenance"

"Evaluating
Cooling Tower
Performance"

FLUOR

BE SURE WITH FLUOR



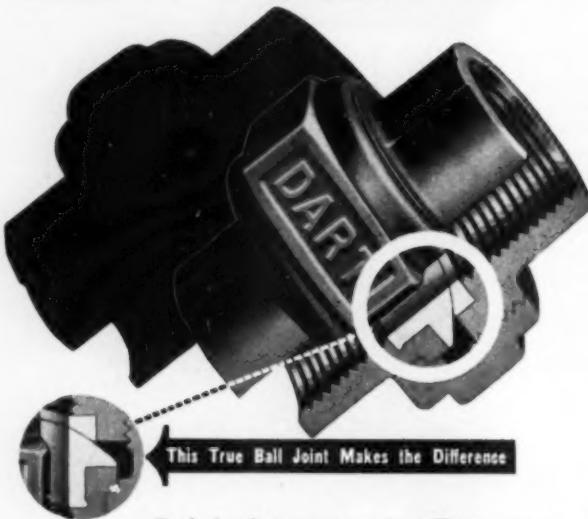
DESIGNERS AND CONSTRUCTORS of Refinery, Natural Gas and Chemical Processing Plants.
MANUFACTURERS of Mufflers, Pulseation Dampeners, Gas Cleaners, Cooling Towers and Fin-Fan Units.

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THE FLUOR CORPORATION, LTD., 2500 S. Atlantic Blvd., Los Angeles 22, Calif. Offices in principal cities in the United States
REPRESENTED IN THE STERLING AREAS BY: Head Wrightson Processes Ltd., Teesdale House, Baltic Street, London, E.C.I., England

DART Are Your Best Buy! UNION

Because You Can Use Them
OVER AND OVER AGAIN!



Both the bronze seats in a Dart union are precision ground to form a true ball joint. As a result, a Dart tightens easily — gives a drop tight joint without excessive wrenching. Seats stay unmarred — ready for use again and again.

What's more, they're protected by a body and nut of practically indestructible air refined, high-test malleable iron — another long-life feature.

Because they are made stronger, better, you'll find Darts are *always* your best buy.

E. M. DART MFG. CO.
Providence 5, Rhode Island



a safety valve to protect the user. If a rigging must be left overnight, the handle can be removed, instantly leaving the setup tamperproof. A combination of three swivel hooks and a built-in pulley block allows work to be done around corners, and as close as 10 inches at the $\frac{3}{4}$ ton rating. The hoist can be operated in any position, and may be set for forward, reverse, or free wheeling. Extensions of any length are available for extra reach.

The device is useful for moving machinery, lifting engines and reduction gears, repairing belts and conveyors, pulling wire and cable, lining up concrete forms or mats, lifting pipes and unit heaters into position, and for other industrial applications where light weight and portability are required.

Fire Extinguisher

A-29 AMERICAN - LAFRANCE - FOAMITE CORP., Elmira, N. Y., is producing a new dry chemical engine for extinguishing flammable liquid and electrical type industrial fires. Known as the Alfo 350 dry chemical wheeled portable engine, the unit can be handled by two men.

The tank of the engine contains 350 lb of dry chemical. The entire contents can be discharged if necessary in about one minute and fifteen seconds. Expendable is dry nitrogen, with a sustained operating pressure of 200 psi during the period of discharge. Further information is available from the manufacturer.

Bronze Globe Valve

A-30 THE FAIRBANKS COMPANY, 393 Lafayette St., New York 3, N. Y., has introduced a 150-pound bronze globe valve, featuring stainless steel plug disc and seat, heat-treated to a hardness of 500 Brinell. The valves are said to be resistant to corrosion, wire drawing or damage due to solid particles in the fluid flow.

The two-piece union bonnet and the radial seat are designed to insure a perfect body bonnet joint, rigid alignment of parts, and easy access to plug disc and seat for regrinding or replacement.

FREE READER SERVICE

To obtain free information on this equipment, circle number on the page 17 free post card.

THE WATERSPHERE

**what could be
more appropriate?
... or more efficient?**



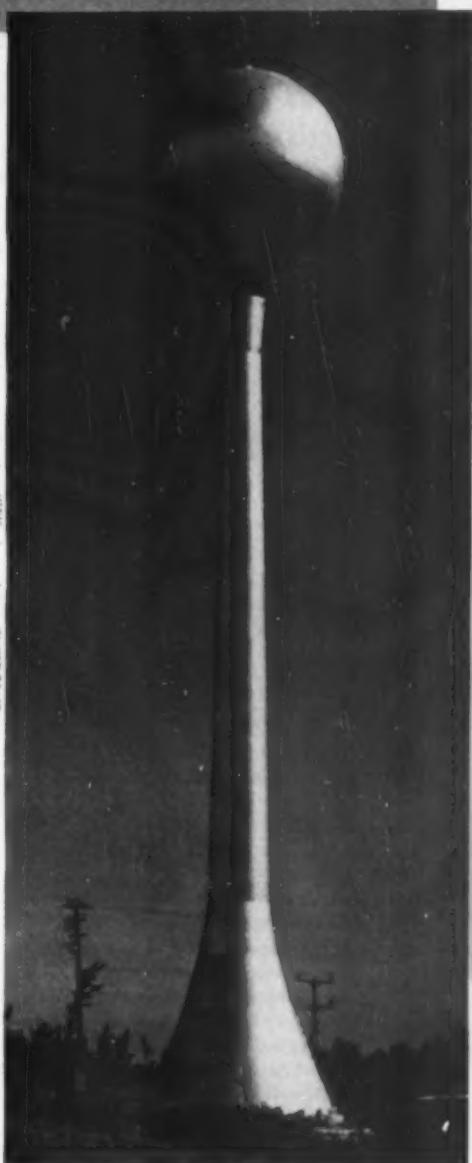
An increasing number of golf clubs throughout the country are discovering that a Horton Watersphere ideally answers the problem of a dependable water supply. Its striking resemblance to a "ball and tee" is the result of a design that is both completely appropriate and functionally efficient.

For basically the Watersphere is a welded steel elevated tank with the inherent advantage of gravity pressure . . . 'round-the-clock performance. You are assured of water when you want it.

Recently the exclusive Seminole Golf Club in East Palm Beach, Florida installed a 60,000-gallon Watersphere. It provides water for the club house, the course, and also the nearby community of Juno Beach. Due to the hurricane hazard, this Watersphere has been especially constructed to withstand winds up to 150 mph.

Consider a Watersphere for your club, factory, or school—wherever efficient water service is desirable. They are built in capacities ranging from 25,000 to 250,000 gallons.

Write our nearest office for complete information.

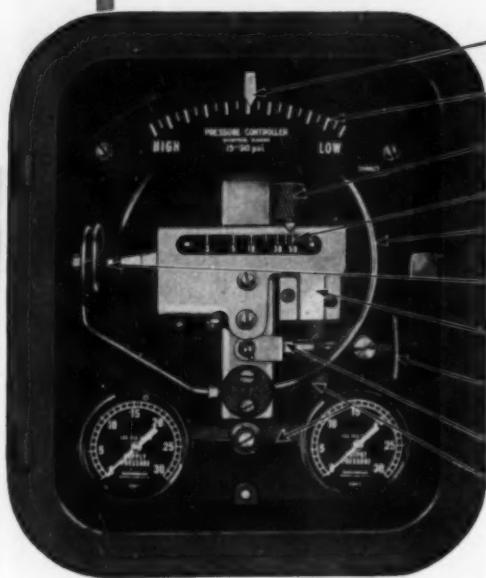


CHICAGO BRIDGE & IRON COMPANY

Atlanta 3	2180 Peachtree Bldg.	Detroit 26	1534 Lafayette Bldg.	Philadelphia 2	1646-1700 Walnut St. Bldg.
Birmingham 1	1531 North Fifteenth St.	Houston 2	2132 National Standard Bldg.	Salt Lake City 4	345 West 17th South St.
Boston 10	1044-201 Devonshire St.	Havana	402 Abreu Bldg.	San Francisco 4	1521-200 Bush St.
Chicago 4	2107 McCormick Bldg.	Los Angeles 17	1545 General Petroleum Bldg.	Seattle 1	1345 Mooney Bldg.
Cleveland 15	2218 Gullibell Bldg.	New York 6	2312-145 Broadway Bldg.	Tulsa 3	1628 Hunt Bldg.
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PA.				In Canada	HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

MASONEILAN MODEL 2700 PRESSURE CONTROLLER

Offers Accurate Proportional Control...
Precise Response...
Ease of Adjustment...



...YET IS MODERATELY PRICED

Masoneilan No. 2700 Pressure Controllers are especially designed for applications requiring accurate control when expensive instruments are not warranted. The pneumatic feedback, usually found only in more elaborate proportional controllers, assures precise response. The Control point setting mechanism provides accuracy of adjustment and easily read expanded index scale. Control action is reversible with either bourdon or bellows. The controllers are furnished in two case styles: a universal case for panel mounting; and a specially designed case for valve or wall surface mounting.

Applications include — pump governors, steam pressure reducing stations, gas well pressure reduction, and many others requiring small to intermediate proportional band.

MASON-NEILAN REGULATOR COMPANY
1206 ADAMS STREET, BOSTON 24, MASSACHUSETTS, U. S. A.

Sales Offices or Distributors in the Following Cities: New York • Syracuse • Chicago
St. Louis • Philadelphia • Houston • Denver • Pittsburgh • Cleveland • Cincinnati • Tulsa
Atlanta • Los Angeles • San Francisco • Salt Lake City • El Paso • Boise • Albuquerque
Detroit • Charlotte, N. C. Mason-Neilan Regulator Co., Ltd., Montreal and Toronto

Control Valves

A-31 PARKER APPLIANCE Co., 17325 Euclid Ave., Cleveland 12, Ohio, has introduced new low-cost hydraulic control valves—open-center, double spool type, and offered in 3-way, 4-way or combination styles.

Constructed for heavy-duty service on construction and materials handling machinery, the valves may be used for either single or double-acting cylinders which are not required to operate at the same time.

Operating at pressures of 2000 psi, they feature an externally adjustable, built-in, balanced seatless relief valve, with minimum pressure rise preventing excessive oil temperature rise and keeping power input at a minimum.

Pressure drop through the open center of the valve is approximately 32 psi at the rated capacity of 14 gpm, though flow rates up to 20 gpm may be handled.

TECHNICAL BOOKS

Manual of Instrument Transformers

PREPARED BY APPARATUS DEPARTMENT,
GENERAL ELECTRIC CO., Schenectady, N. Y.

PUBLISHED BY METER & INSTRUMENT
DIVISIONS, GENERAL ELECTRIC CO.,
West Lynn, Mass.

8½ x 11 inches—76 pages

Price, \$1.00

The new G-E Manual of Instrument Transformers covers the theory of operation and the application of instrument transformers. It is prepared especially for practicing engineers and students engaged in the fields of power generation, transmission and application where solution metering and relaying problems involve the correct application of instrument transformers.

The manual covers the basic fundamentals of instrument transformers, such as accuracy standards, insulation and polarity. It gives information on potential and current transformers, including operating principles, types and ratings, applications, circuits, fusing.

A chart for selecting the proper transformers for a specific application and a bibliography covering various phases of instrument transformer operation, design, application and performance also are included.

NEWS

C. G. Forshey in New Houston Office

C. G. FORSHAY, materials handling engineering, surveys, and sales, serving the Southwest, has established new offices at 3514 Crawford St., HOUSTON, TEXAS.

Mr. Forshey handles Hanna air specialties, Mathews & Stephens-Adamson conveyors, Hand-El overhead cranes, Sly dust removal and sand blasting systems, Air-Spur Gear-Electric hoists, Louden monorail systems, Merrick volumetric and conveyor scales and Thomas trucks.

*

Barber-Colman—Atlanta

BARBER-COLMAN COMPANY, Rockford, Ill., has announced the opening of a branch office at 305 Techwood

FUTURE EVENTS Of Engineering Interest

AMERICAN SOCIETY OF MECHANICAL ENGINEERS AND SOCIETY FOR THE ADVANCEMENT OF MANAGEMENT, Clapp & Polak, Inc., Show Management, 341 Madison Ave., New York 17, N. Y.

Jan. 15-18, Plant Maintenance Show, Cleveland, Ohio.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, International Exposition Co., Charles F. Roth, Mgr., 480 Lexington Ave., New York 17, N. Y.

Jan. 22-26, 10th International Heating and Ventilating Exposition, Commercial Museum, Philadelphia, Pa.

AMERICAN SOCIETY FOR TESTING MATERIALS, Sec'y, 1916 Race St., Philadelphia 3, Pa.

March 5-9, Spring Meeting and Committee Week, Cincinnati, Ohio.

INTERNATIONAL INDUSTRIAL EXPOSITION, Ed G. Lonsner, Gen. Mgr., 41 San Jacinto St., Houston 2, Texas.

March 11-17, Coliseum, Houston, Texas.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, C. E. Davies, Sec'y, 29 West 39th St., New York, N. Y.

April 2-5, Spring Meeting, Hotel Atlanta-Biltmore, Atlanta, Ga.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, C. E. Davies, Sec'y, 29 West 39th St., New York, N. Y.

April 17-19, Process Industries Conference, Baltimore, Md.

NATIONAL MATERIALS HANDLING EXPOSITION, Clapp & Polak, Inc., 341 Madison Ave., New York 17, N. Y.

April 30-May 4, Fourth Annual Exposition, International Amphitheatre, Chicago, Ill.

EVERLASTING Boiler Blow-off Valves...

Teamed Up For "EVERLASTING" Service



The unique service qualities of EVERLASTING Blow-off Valves have long been demonstrated in boiler-rooms throughout the country. Now their superior design features have been teamed up in these new EVERLASTING Duplex Blow-off Units.

HERE'S WHAT YOU GET WITH THESE NEW DUPLEX UNITS

Sealing Valve (shown on left of unit)

- Lever- or wheel-operated types—as you desire
- Unrestricted flow — straight-through
- Rotating sliding disc—self-grinding, self-lapping
- Drop-tight seal—improving with use
- Non-wedge action — no sticking, no jamming

Blowing Valve (shown on right of unit)

- Straight-way or angle types to select from
- Strength to withstand repeated shock of blow-off force
- Exceptional resistance to erosion, abrasion and rust
- No pockets to permit lodgment of solids
- Positive action, self-cleaning

Not only do these EVERLASTING Duplex Blow-off Units provide an absolutely drop-tight seal — they are so constructed that long and repeated operation will not affect this tightness. Other Duplex Units for varied requirements are shown in our Bulletin.

Either valve of any EVERLASTING Duplex Unit can be supplied separately. But for boiler blow-off applications, any one of the complete EVERLASTING Duplex Units assures absolute safety — at low maintenance cost.

Ask your distributor — or write directly to us — for complete information.

EVERLASTING VALVE CO., 49 FISK STREET, JERSEY CITY 5, N. J.

EV 038A

Everlasting Valves

Trade-Mark "EVERLASTING" REG. U. S. PAT. OFF.

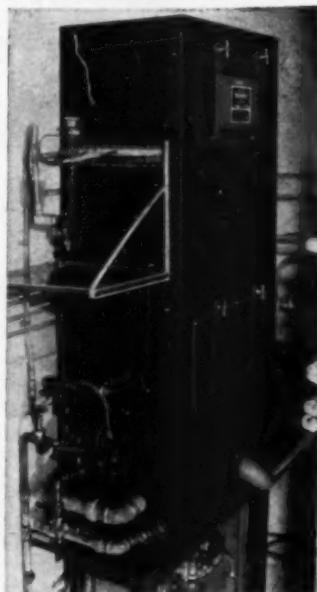
for everlasting protection

New "Controlled Humidity" Method Gives a Better Solution to Air Conditioning Problems

"Hygrol" Absorbent Liquid Dehumidifies Fresh Air Without Refrigeration

NIAGARA Air Conditioners or Dehumidifiers using "Hygrol" liquid absorbent give precise control of air temperature and humidity... at lower operating cost, with large savings in space and with smaller and less expensive equipment, in many applications.

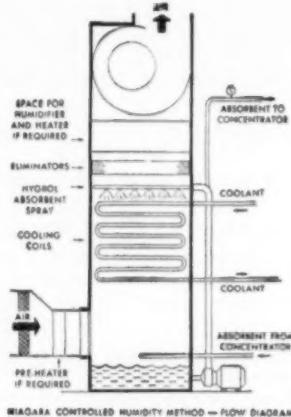
This method dehumidifies the air by passing it through a chamber in which "Hygrol" spray removes its moisture and produces a low dew point. The "Hygrol" solution resulting is continuously and automatically re-concentrated, providing always full capacity in



air conditioning and assuring always a constant dehumidifying capacity and a trustworthy, constant condition for your material, apparatus, process or room to be conditioned.

"Hygrol" is a liquid, not a salt solution; it stays pure and non-corrosive; it does not cause maintenance or operating troubles in food plants or in chemical processes.

Investigate this new Niagara Method for "comfort" air conditioning as well as to protect quality in hygroscopic material, or processes or instruments, or to prevent condensation damage to metals, parts or products.



Write for Bulletin 112

NIAGARA BLOWER COMPANY

Over 35 Years Service in Industrial Air Engineering

Dept. SP, 405 Lexington Ave.

Experienced District Engineers in all Principal Cities

New York 17, N.Y.

Drive, ATLANTA, GEORGIA, under the management of PETE VAN DAE. The company offers service in the solution of automatic control and air distribution problems.

Big State Boiler Co., Inc.—Southwest

The BIG STATE BOILER CO., INC., District Representative for the International Boiler Works in Texas, Oklahoma, Eastern New Mexico, and Arkansas, is now located in its new headquarters at 701 W. Fogg, Box 973, Southside Station, FORT WORTH, TEXAS. J. P. PHILIBERT is president of the company.

G. E.—St. Louis

JAMES M. MCGARRY has been appointed manager of advertising and sales promotion for the GENERAL ELECTRIC APPARATUS DEPARTMENT'S St. Louis office, Mid-States District, G. F. Maughmer, district manager, has announced.

Until his appointment at St. Louis, McGarry was head of Transport Industries publicity and handled special publicity assignments in the Apparatus Department's news bureau in Schenectady, N. Y.

Bookout—Cochrane Sales Manager

COCHRANE CORPORATION, Philadelphia, Pa., manufacturers of water conditioning apparatus and steam power plant specialties, announce the appointment of ERVIN J. BOOKOUT to the post of General Sales Manager.



Ervin J. Bookout

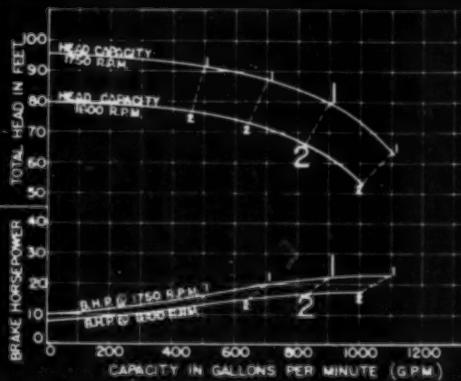
Mr. Bookout has been Cochrane's Eastern Sales Manager, and before that for many years a Sales Engineer in their Philadelphia territory.

Pointers on Pumps

WHAT HAPPENS WHEN THE SPEED OF A CENTRIFUGAL PUMP IS CHANGED?



The characteristics of a centrifugal pump are revealed by curves showing the relation between developed head and capacity, and between brake horsepower and capacity. These curves are usually based on a constant speed and a definite impeller diameter. When the pump's speed is changed, the resulting changes in its performance curves can be predicted by a few calculations. For every point on the original curves there is a corresponding point on the curves for the new speed — and by plotting a sufficient number of these points, curves can be drawn to show the pump performance at the new speed.



For Expert Advice . . .

on any pumping problem, contact our nearest District Office. And for sure satisfaction in any pumping application, choose from the most complete line of pumps in the field . . . the line that proves there's more worth in Worthington. *Worthington Pump and Machinery Corporation, Centrifugal Pump Division, Harrison, N. J.*

HOW TO PLOT THE PERFORMANCE CURVES FOR A 4" PUMP AT 1600 RPM WHEN THE CHARACTERISTICS AT 1750 RPM ARE KNOWN

GPM = gallons per minute RPM = revolutions per minute
 H = head in feet BHP = brake horsepower
 At constant impeller diameter:

$$\frac{GPM_2}{GPM_1} = \frac{BPM_2}{BPM_1} = \frac{\sqrt{H_2}}{\sqrt{H_1}} = \frac{3\sqrt{BHP_2}}{2\sqrt{BHP_1}}$$

Taking 900 GPM and 80 ft. head at 1750 rpm as point number 1, then:

$$GPM_2 = \left(\frac{RPM_2}{RPM_1} \right) GPM_1 = \left(\frac{1600}{1750} \right) 900 = 823 \text{ GPM}$$

$$H_2 = \left(\frac{RPM_2}{RPM_1} \right)^2 H_1 = \left(\frac{1600}{1750} \right)^2 80 = 66.8 \text{ Feet}$$

$$BHP_2 = \left(\frac{RPM_2}{RPM_1} \right)^2 BHP_1 = \left(\frac{1600}{1750} \right)^2 22 = 16.8 \text{ BHP}$$

By taking other points for number 1, such as 500 gpm at 91 feet, 700 gpm at 87 feet and 1100 gpm at 64 feet, enough corresponding number 2 points are located to draw the expected 1600 rpm performance curve.

NOTE: It is also possible to predict the effect of changing the impeller diameter at a constant speed, by applying the basic formula:

$$\frac{GPM_2}{GPM_1} = \frac{\text{Diameter}_2}{\text{Diameter}_1} = \frac{\sqrt{H_2}}{\sqrt{H_1}} = \frac{3\sqrt{BHP_2}}{2\sqrt{BHP_1}}$$



WORTHINGTON



THE WORLD'S
BROADEST LINE
ASSURES YOU THE
RIGHT PUMP FOR
EVERY JOB

Steam

Power

Rotary

Vertical Turbine

Centrifugal

3 men
+ 3 "J" hoists



multiply production many times

Here's proof that small companies as well as large can increase productivity per man with R & M hoists. Finger Lakes Chemical Co., Inc., Etna, N. Y. has repeat-ordered R & M "J" hoists again and again to permit vertical as well as lateral materials handling in the progressive expansion of plant operations to the upper floors and to the basement of their building. "Each time a hoist was installed," writes Mr. C. S. Benjamin, vice president, "we acquired a substantial increase in productive capacity *without increased labor*. In fact, the work became easier for the men. Today, as manufacturers of detergents . . . we receive and ship in carload and truckload quantities, with the entire operation being accomplished by a force of three men and one foreman."

With an R & M crane or hoist installation engineered to your job—more production per man or per foot of floor space may be easier to obtain than you think. Your nearest R & M field engineer will be glad to study your requirements without obligation. Write for Bulletin No. S11P.

TAKE IT UP WITH

ROBBINS & MYERS

HOIST AND CRANE DIVISION, SPRINGFIELD 99, OHIO

MOTORS HOISTS CRANES
FANS MOYNO PUMPS

Bailey Meter Assigns Branches

To meet increased demands for expert engineering services in power and process fields, BAILEY METER COMPANY, manufacturer of instruments and controls, has assigned the following engineers to branch office posts: P. K. BOLYARD, 184 Pryor St., S. W., ATLANTA 3, GEORGIA; R. E. PAULSON, 7725 Ward Parkway, KANSAS CITY 5, MISSOURI; and O. M. THOMPSON, 2509 Carew Tower Bldg., Cincinnati 2, Ohio.

**Raybestos-Manhattan Moves
New Orleans Office**

RAYBESTOS-MANHATTAN, INC., has announced the removal of its NEW ORLEANS office and warehouse from 1009 Camp Street to 920 Calliope Street. The new facilities will enable the company to serve customers in that area with a more complete stock of belting, V-belts, hose, other industrial rubber products, packings and asbestos textiles.

**Automatic's Charleston
Representative Names Metheny**

Appointment of JAMES T. METHENY to its sales staff has been announced by JEFFERDS AND MOORE, INC., CHARLESTON, W. VA. representative for the AUTOMATIC TRANSPORTATION COMPANY, Chicago materials handling equipment manufacturer.

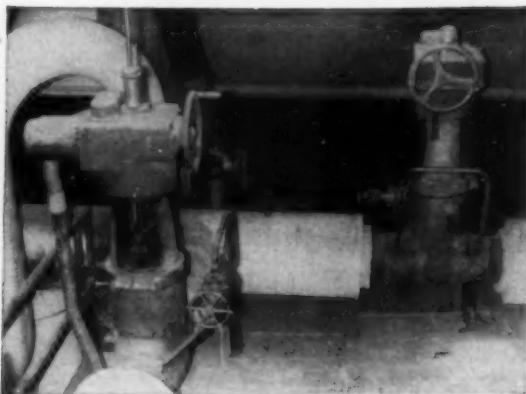
He succeeds James M. Arnett, who resigned to open his own accounting firm.

Black & Decker—Southeast

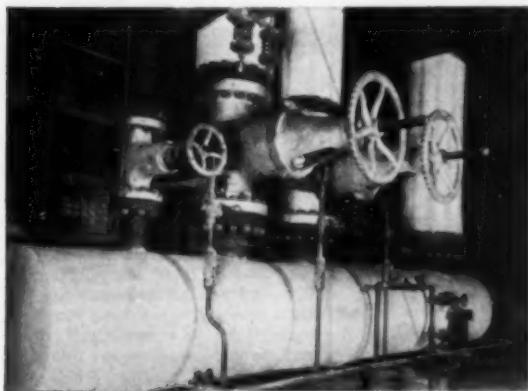
Several new promotions to the field sales force, as well as changes within their service organization, have been announced by THE BLACK & DECKER MFG. CO., TOWSON, MD., manufacturers of portable electric tools.

MR. ROBERT A. BROWN who has been Service Engineer at the Cincinnati Factory Service Station is promoted to Sales Engineer in the ATLANTA BRANCH territory. Mr. Brown will work with distributors of Black & Decker, Van Dorn and Home-Utility Electric Tools in the northern part of GEORGIA and eastern TENNESSEE areas.

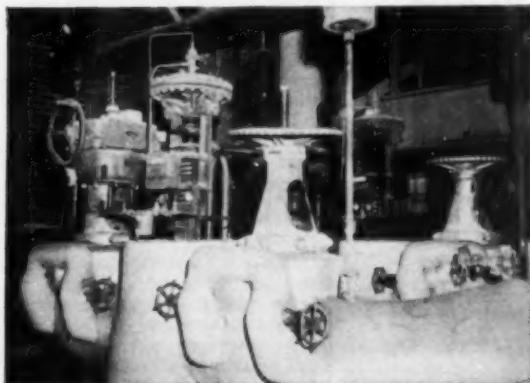
Also, it is announced that WM. F. DUNN, JR., formerly Service Engineer at the NEW ORLEANS Branch has been promoted to Sales Engineer in this territory. Mr. GRADY R. FUNK, Service Engineer at CHARLOTTE, has been transferred to fill Mr. Dunn's former position.



Walworth Motor Operated Series 900 Pressure-Seal Cast Steel Gate Valves.



Walworth Series 600 Pressure-Seal Cast Steel Gate Valves.



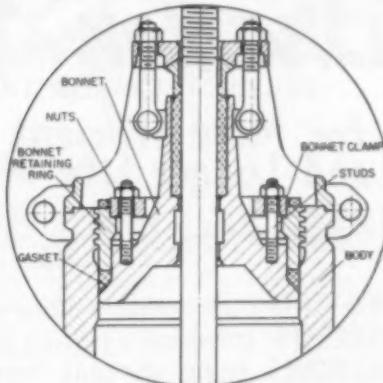
Manually operated and motor operated Walworth Series 900 Pressure-Seal Cast Steel Gate Valves.

WALWORTH PRESSURE-SEAL CAST STEEL VALVES

The bonnet and body design of Walworth Pressure-Seal Valves is such that the pressure within the valve is used to prevent leakage at the junction of the bonnet and body. Sudden temperature and pressure changes do not affect this tightness. Bonnet flanges and studs are eliminated and the weight of the valve is reduced.

An improved disc design provides flexibility, and helps keep seats tight, even when the valve body may be distorted by pipeline stresses, or by temperature and pressure changes. This improved disc design makes it easier to open and close this valve.

Walworth Pressure-Seal Valves are easy to disassemble and assemble, and are the most satisfactory valves for high-pressure, high-temperature service. They are available in Series 600, 900, and 1500 and in a wide range of sizes and types. For further information, see your nearest Walworth Distributor, or write: Walworth Company, 60 East 42nd Street New York 17, N. Y.



A cross section of the bonnet joint assembly of a Walworth Pressure-Seal Cast Steel Gate Valve. The internal pressure is utilized to make the body-to-bonnet joint tight.

WALWORTH valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD
SOUTHERN POWER & INDUSTRY for JANUARY, 1951

Oliver Iron & Steel—Texas

THE OLIVER IRON AND STEEL CORPORATION of Pittsburgh announces the opening of a new POLE LINE MATERIAL DIVISION branch warehouse at 150 Howell St., DALLAS, TEXAS. According to B. W. JOHNSON, general sales manager of the division, the new warehouse will facilitate delivery of pole line materials throughout the entire Southwest.

SW Research Expands

Collaboration by SOUTHWEST RESEARCH INSTITUTE, SAN ANTONIO, TEXAS, with directors of the Monterrey Institute of Technology in creating a non-profit industrial research institute in Mexico was announced at

Southwest Research Institute's annual trustees meeting.

The San Antonio scientific research institute thus further expanded its international activities which already include projects in Brazil, France, Cuba, Italy and Mexico.

ASME Elects J. Calvin Brown

The election of J. CALVIN BROWN, engineer and patent attorney of Los Angeles, as president of THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS for 1951, was announced at the Society's 71st annual meeting.

The new president succeeds James D. Cunningham, of Chicago. Mr. Brown became a member of the ASME in 1928. He served as manager

of the society in 1943-44 and as vice president from 1945 to 1949.

Westinghouse Expands—Baltimore

THE WESTINGHOUSE ELECTRIC CORPORATION has opened negotiations for a tract of land near the BALTIMORE, MARYLAND, Friendship Airport for a new plant to meet expanding military demand for products of the Company's Electronics and X-Ray Division.

The new plant will have a manufacturing area of about 400,000 sq ft, and in normal times will employ 2,000 people. Additional land is to be provided for possible future expansion.

Southern States Equipment Celebrates 34th Anniversary

THE SOUTHERN STATES EQUIPMENT CORPORATION of HAMPTON, GEORGIA, manufacturer of high voltage equipment for the electrical utility industry, commemorated its 34th Anniversary with a dinner at the Henry Grady Hotel in Atlanta, Georgia, on December 7. The occasion also marked the 10th Anniversary of the organization as a Georgia concern.

Representatives of the Georgia Power Company, industrial and business leaders from Atlanta, Griffin, Hampton and McDonough were invited guests. The company was represented by its own officers, office and factory supervisory personnel and sales representatives.

Southern States was founded in Birmingham, Alabama, in 1916, and since its inception has been a pioneer in the development and manufacture of high voltage switching and fusing equipment. It serves the electrical utility business on a nation wide scale and is now the third largest independent manufacturer of this type equipment.

The company acquired the Hampton facilities in 1940 and operated them during the five war years for the production of war materials. Following the war, all operations were moved from Birmingham to Hampton.

Southern States' mechanical division, which manufactures textile machine specialties and replacement parts for the textile industry, provides thorough coverage for the Southeastern textile manufacturing plants and is represented in the New England States.

The company employs approximately 350 people, and has an annual payroll of approximately \$1,000,000.

WATER TROUBLE?

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Braxon or Flako

BOILER FEEDWATER TREATMENT

for More Efficient Operation and Longer Life of BOILERS!

Special Formula for your particular Water...

- PREVENTS scale, corrosion + pitting in NEW BOILERS
- ARRESTS corrosion + pitting in OLD BOILERS +
- REMOVES scale already formed.

WE MAINTAIN CLOSE LABORATORY CONTROL
OVER BOILER WATER TO INSURE RESULTS.
CONTACT OUR SERVICE ENGINEER IN
YOUR TERRITORY OR CALL—

ANDERSON CHEMICAL CO., INC.
CHEMICAL ENGINEERING SERVICE
1620 WATERVILLE RD. — MACON, GA. — TEL. IVY 1284



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- ✓ Efficient Operation
- ✓ Minimum Fuel Costs
- ✓ Low Maintenance
- ✓ Long, Trouble-Free Life



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The high degree of skill acquired by Navco Engineers from long experience in solving unusual Piping problems is your guarantee of an accurate and workmanlike Piping System.

Consult Navco for your next Piping Job



NAVCO PIPING

NATIONAL VALVE & MANUFACTURING COMPANY • PITTSBURGH, PA.

NEW YORK • CHICAGO • CLEVELAND • BOSTON • ATLANTA • TULSA • BUFFALO • CINCINNATI

Eggelhof Engineers—New Orleans

AL DECKERT has joined the EGGELHOF ENGINEERS organization in the NEW ORLEANS office and will serve as Sales Engineer in the LOUISIANA, MISSISSIPPI and ALABAMA area covered by this organization east of New Orleans. HENRY TURNER, District Manager, will devote his time to the Louisiana territory west of and including New Orleans.



Al Deckert

Mr. Deckert is an L.S.U. graduate in Mechanical Engineering, and has had experience as an instrument technician.

Eggelhof Engineers are manufacturer-

ers representatives for power plant equipment, industrial apparatus and controls, and steam specialties with offices covering Texas, Oklahoma, Arkansas, Louisiana and Southern Mississippi and Alabama.

Southern Research Elects Kerrigan

PHILLIPS KERRIGAN, JR., President of KERRIGAN IRON WORKS, INC., NASHVILLE, TENNESSEE, was recently elected to membership on the SOUTHERN RESEARCH INSTITUTE's Advisory Council. Mr. Kerrigan will hold office for a three year period.

Drew Appoints Southwest District Manager

The Power Chemicals Division, E. F. DREW & CO., INC., New York 10, N. Y., has announced the appointment of PERRY S. LAWRENCE as the Southwest District Manager.

Mr. Lawrence has been a member of the Drew organization for a number of years and has had wide experience as a chemical engineer. Mr. Lawrence will be responsible for the sale and service of Drew Power Chemicals in TEXAS, ARKANSAS, OKLAHOMA and LOUISIANA.

Eagle Signal Appoints Combs

THE EAGLE SIGNAL CORPORATION, Moline, Illinois, manufacturers of a complete line of timing and counting devices for industrial and process controls, has appointed the THOMAS B. COMBS COMPANY, 505 Bona Allen Bldg., Atlanta, Georgia, as a direct factory representative for GEORGIA, NORTH CAROLINA and SOUTH CAROLINA.

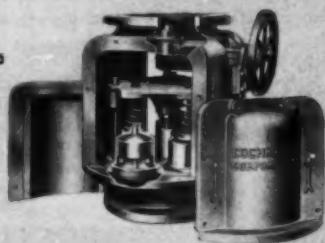


Tom Combs

The establishment of the Atlanta factory representative, supplements other representation in Baltimore, Birmingham, Houston, and Jacksonville, Florida.

WON'T STICK
WON'T JAM
WON'T FREEZE

MANY SMALL
DISCS INSTEAD
OF ONE
LARGE DISC
REDUCES
IMPACT,
MAKES A
TIGHTER
VALVE.



MANY SMALL
PORTS INSTEAD
OF ONE
LARGE PORT
PREVENTS
FAILURE,
MULTIPLIES
FLOW
AREA.

COCHRANE MULTI-PORT
RELIEF VALVES

COCHRANE CORPORATION • PHILADELPHIA 32, PA.

UNEQUALLED
...FOR MAKING
LASTING SPLICES



...users who KNOW
buy only the BEST

Ask for
them by name...

**OKONITE and
MANSON tapes**

Heating and Ventilating Exposition

A wide variety of new products will be displayed at the TENTH INTERNATIONAL HEATING & VENTILATING EXPOSITION in the Commercial Museum, Philadelphia, January 22 to 26. The exposition, also known as the AIR CONDITIONING EXPOSITION, is being held under the auspices of the American Society of Heating and Ventilating Engineers, and many of the displays are collateral with the program of the Society's 57th annual meeting, which will be held during the same period.

The International Exposition Company, of New York, conducts the Expositions. The manager is Charles F. Roth, and the associate manager, E. K. Stevens.

Kaylo—New Orleans

THE KAYLO DIVISION, OWENS-ILLINOIS GLASS COMPANY, Toledo, Ohio, has announced the appointment of REILLY-BENTON COMPANY, INCORPORATED, NEW ORLEANS, LOUISIANA, as distributors of their heat insulation for the area of LOUISIANA and MISSISSIPPI.

The Reilly-Benton Company, Incorporated, are solely wholesale distributors of insulation materials and accessories engaging in no application work. They maintain sales representatives at New Orleans, for the State of Louisiana, and Jackson, for the State of Mississippi.

Allis-Chalmers—South & Southwest

Newly named Southern dealers for ALLIS-CHALMERS general machinery division are the ERNEST EQUIPMENT & SUPPLY COMPANY, LEXINGTON, KENTUCKY; the ARROW ELECTRICAL CONSTRUCTION COMPANY, SHREVEPORT, LOUISIANA, and the ELECTRICAL MACHINERY & REPAIR COMPANY, 801 South Fourth Street, BEAUMONT, TEXAS. The latter company has also been appointed a certified service shop for Allis-Chalmers motors, controls and transformers.

H. A. ISAACS is vice-president and JAMES R. ERNEST is in charge of sales for the Ernest Equipment & Supply Company, 829 National Avenue, Lexington, Kentucky.

W. L. PRUETT is head of the Arrow Electrical Construction Company, Shreveport, Louisiana.

GEORGE T. KINARD is owner and S. W. WALKER in charge of sales for the

Electrical Machinery & Repair Company, 801 South Fourth Street, Beaumont.

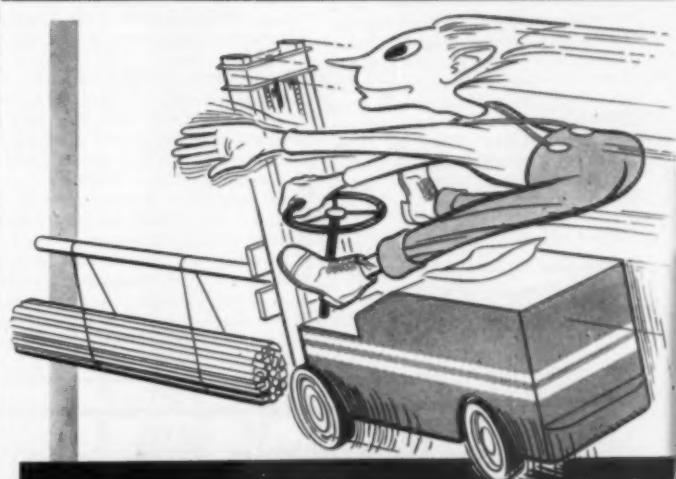
THE ELECTRICAL SERVICE COMPANY, 723 Towson Avenue, FORT SMITH, ARKANSAS, has also been named a dealer for Allis-Chalmers controls in 14 counties in northwestern and western Arkansas.

THE CENTRAL ELECTRIC REPAIR COMPANY, FAIRMONT, WEST VIRGINIA, has been appointed a certified service shop for Allis-Chalmers motors and controls in 11 counties in north and east central West Virginia. E. R. MANLEY is president.

Electric Products Co—Kansas City

THE ELECTRIC PRODUCTS COMPANY of Cleveland, Ohio, have appointed the POWER EQUIPMENT COMPANY as their representatives in the western counties of IOWA and MISSOURI, the panhandle counties of TEXAS and the states of ARKANSAS, OKLAHOMA and KANSAS.

With offices in Kansas City, Missouri, the company will handle synchronous and induction motors, a-c and d-c motors and generators, battery chargers, electrolytic power supplies and frequency changers.



We're doing our dead level best!



Running a steel warehouse is tough enough in normal times. But today it is really tough.

We're on the phone, burning up the telegraph lines, or running the special delivery boys ragged, day in and day out, trying to get materials for you. And we are handling orders just as rapidly as we can.

We're doing our dead level best to meet the needs of our customers, and we'll never stop trying.

One thing we are asking of our customers is that they order only what they actually need. Stockpiling is out. Government orders restrict inventories to normal requirements.

By full cooperation on everybody's part, all of us will fare better.

WAREHOUSE DIVISION
Atlantic Steel Company

ATLANTA, GEORGIA • EMERSON 3451

Georgia Power Expands

Excavation has begun for the foundations for an enlarged power-house at the Bartletts Ferry hydroelectric project on the Chattahoochee River near COLUMBUS, GA. A 20,000 kilowatt generator will be installed in the powerhouse increasing the capacity of this project from 45,000 to 65,000 kilowatts. This work will be done at a cost of nearly \$1,500,000.

Actual construction of the powerhouse is scheduled to be completed in April, 1951. The generator will go into operation in December, 1951.

The Bartletts Ferry project is a part of the company's widespread expansion and building program. Other projects under way include a 40,000 kilowatt hydroelectric plant at Furman Shoals near Milledgeville, two additional 100,000 kilowatt steam-electric generating units at Plant Yates near Newnan and a 40,000 kilowatt steam plant to be located in the Brunswick area.

Surface Combustion—Chattanooga

The appointment of PAUL E. CRAFTON as a CHATTANOOGA district sales engineer for the F. J. EVANS ENGINEER-

ING COMPANY, BIRMINGHAM, was announced recently.

Mr. Crafton, who will be located at 3808 Mission View Avenue, Chattanooga, Tennessee, will specialize in the sale of SURFACE COMBUSTION CORPORATION heat treating furnace and burners and WEBSTER ENGINEERING COMPANY industrial burner equipment.

*

Glidden—Jacksonville, Fla.

Plans for the expansion of the NAVAL STORES DIVISION of the GLIDDEN COMPANY in JACKSONVILLE, FLA., were announced recently.

Designed to increase production capacity of various new products by 30 to 50 per cent, the first step in the program is an immediate investment of \$200,000 in new facilities. Substantial improvements in Glidden's pine-wood distillation department are included in the program which will take several years to complete.

Glidden's interests at Jacksonville include management and part ownership of the JACKSONVILLE PROCESSING CORPORATION. DR. W. DAVID STALLCUP is vice president of this corporation

and manager of Glidden's Naval Stores operations. DR. J. P. BAIN is research director and R. L. DIGGS is in charge of sales.

*

Hudson Expands in Florida

THE HUDSON PULP & PAPER COMPANY has awarded a contract to the Power Piping Division of BLAW-KNOX COMPANY for the piping requirements of an expansion project at its PALATKA, FLORIDA, plant.

The additions to this plant will increase capacity for the manufacture of cement bags and other waterproof paper products, now in tight supply. The award to Blaw-Knox covers the fabrication and erection of the complete piping systems for a new power plant and the additional process equipment, and also for the installation of paper mill equipment.

The new power plant consists of a power boiler, a recovery boiler and a 10,000 kva turbine operated at 425 pounds pressure and 750 degrees Fahrenheit.

*

Parker Appoints Hudgins

The appointment of R. W. HUDGINS & SON, NORFOLK, VA., as distributors for the industrial products of THE PARKER APPLIANCE COMPANY, Cleveland, has been announced.

Hudgins & Son, located at 3 Commerce Street, will stock tube fittings, tube fabricating tools and related items, and will offer engineering service in the application of these products to all types of hydraulic and fluid-handling systems.

*

Cutler-Hammer—Dallas

Announcement is made by Cutler-Hammer, Inc., Milwaukee, of the appointment of R. A. HAWORTH as manager of their DALLAS, TEXAS district sales office.

Mr. Haworth joined the company in 1934 upon his graduation from the University of Wisconsin with the degree of Electrical Engineer. Upon the opening of their BALTIMORE sales office in 1936, Mr. Haworth was appointed manager and held that position until his Dallas appointment.

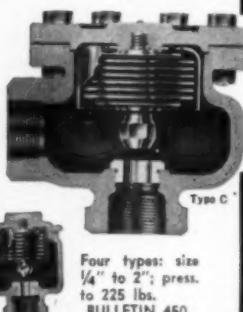
As manager of their Dallas district sales office, Mr. Haworth will also supervise their TULSA, HOUSTON and MIDLAND sales offices.

Nicholson Makes

Freeze-Proof Steam Traps

for Every Plant Use

Because they drain completely when cold, these four types of Nicholson steam traps are positively freeze-proof. Can be freely installed outdoors. Universally recommended for use in lines which need not be in continuous use during cold weather, because they are freeze-proof and because their 2 to 6 times average drainage capacity results in minimum heat-up time. The non-air-binding feature of Nicholson traps also notably facilitates steam transfer in severe weather.



Four types: size
1/4" to 2"; press.
to 225 lbs.
BULLETIN 450.

HIGH-PRESSURE FLOATS—Stainless, monel, steel or plated steel. Welded. In all sizes and shapes; for operating mechanisms and as tanks or vessels. 2-day delivery. BULLETIN 650.

W. H. NICHOLSON & CO., 175 Oregon St., Wilkes-Barre, Pa.

A. M. Byers—Houston

A. M. BYERS CO., Pittsburgh, Pa., wrought-iron manufacturer, has announced the appointment of N. L. BROWN as manager of its HOUSTON division. Mr. Brown, who joined the firm in 1940, was formerly Field Service Engineer with the company's St. Louis division.

He succeeds A. D. Sheere, who has been made manager of the San Francisco division.

D. W. Onan—Atlanta

THE SOUTHERN METER AND TRANSFORMER COMPANY OF ATLANTA, GEORGIA, has been appointed distributor of ONAN PRODUCTS IN GEORGIA.

A complete line of gasoline and Diesel engine-driven electric plants, air-cooled engines and ball-bearing generators will be carried by the company and facilities for the repair and maintenance of generating equipment will be installed.

The Southern Meter and Transformer Company is located at 1375 Lee Street S. W. G. W. McIntosh is president of the firm and R. Allen is secretary and treasurer. G. A. Power is service manager.

Heating and Ventilating Exposition

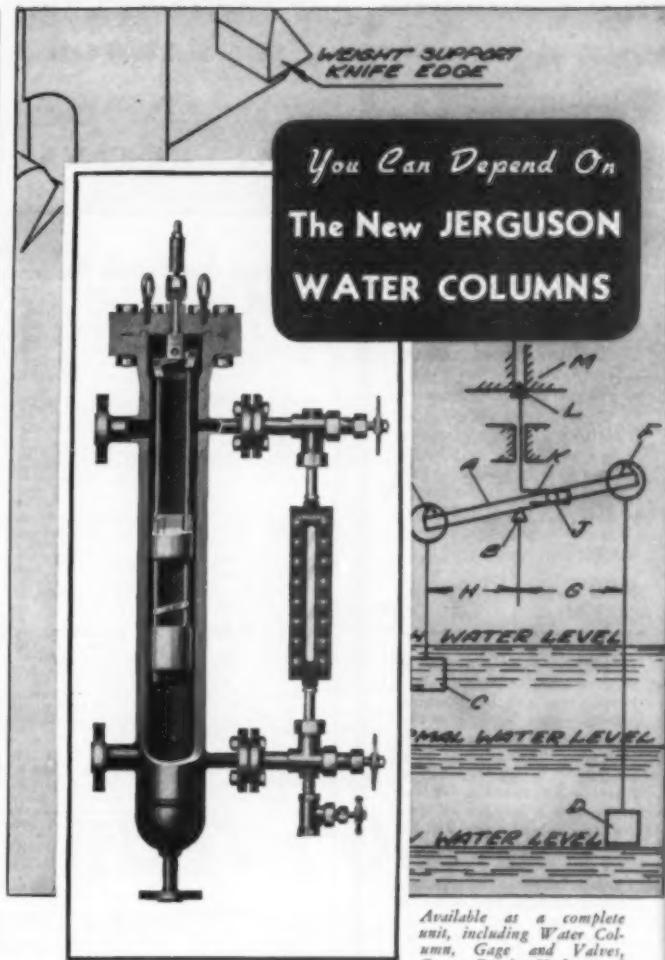
A wide variety of new products will be displayed at the TENTH INTERNATIONAL HEATING & VENTILATING EXPOSITION in the Commercial Museum, Philadelphia, January 22 to 26. The exposition, also known as the AM CONDITIONING EXPOSITION, is being held under the auspices of the American Society of Heating and Ventilating Engineers, and many of the displays are collateral with the program of the Society's 57th annual meeting, which will be held during the same period.

The International Exposition Company, of New York, conducts the Expositions. The manager is Charles F. Roth, and the associate manager, E. K. Stevens.

50th Annual National Power Show Scheduled for San Antonio, Texas

The Golden Anniversary NATIONAL POWER SHOW of the National Association of Power Engineers, Inc., will be staged in SAN ANTONIO, TEXAS, August 21-23, 1951. San Antonio will be converted into a three day market center for power equipment, materials, and supplies.

Held in conjunction with the National Power Show will be the 68th Annual National Convention of the National Association of Power Engineers, Inc.



Available as a complete unit, including Water Column, Gage and Valve, Gage Drain Valve and Try-cocks.

YOU can depend on the New Jerguson Water Columns for positive low water and high water alarm and for long, trouble-free service . . . for they are skillfully engineered and built. New dependability is built into these water columns with a unique alarm mechanism with weights supported on hardened, stainless steel knife-edges. Alarm mechanism is stainless steel throughout; valve stem, cam and knife-edges are carefully hardened.

Jerguson Water Columns are available in a complete range of pressures and sizes and a variety of styles, with screwed or flanged connections.

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**GAGE & VALVE
COMPANY**
Somerville 45, Mass.

Check Your Paint-Stripping Problem HERE

- How can we strip baked-on primer coats without resorting to expensive thinners and solvents?
- Do you have a good idea that'll speed up the removal of toluene-thinned, asphalt-based paints from underground transformers?
- We've had a slew of armature coils in the shop for months, waiting for an economical way to strip insulating varnish... what do you have?
- Other headaches.

NAME.....
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COMPANY.....

Power plant paint-stripping can be done easily and quickly if the proper stripping compound is selected—then applied as recommended. Take transformer stripping, for example. Your nearby Oakite Technical Service Representative can show you a number of job-proven methods, including hot flow-on, cold spray, steam-gum and tank-immersion techniques. He'll help you select the Oakite method best suited to your lay-out... help you find a simple way to save time and money on the job.

Let us have your paint-stripping problems (whatever they might be). We'll ask the Oakite Technical Service Representative in your vicinity to visit your plant and talk them over with you. Or, if you'd like to have some factual data about fast Oakite paint-stripping procedures first, send for a complimentary copy of the Oakite Power Plant Digest of '71 maintenance-cleaning procedures. Oakite Products, Inc., 23 Thames St., New York 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
TECHNIQUE RESEARCH INC.
MATERIALS • METHODS • SERVICE
Technical Service Representatives Located in
Principal Cities of United States and Canada

CATALOGS AND BULLETINS

B-10 INDUSTRIAL WATER CONDITIONING—Brochure, 12 pages—"Water Patrol for Profit Control" discusses control of water temperature and algae in relation to profits of industrial plants. Colored charts and illustrations accompany non-technical explanation.—AQUATROL INC., P. O. Box 12233, Houston, Texas.

B-11 BARREL CART—Catalog 012, 4 pages—Describes drum cart and drum for moving, pouring, and mixing liquid or powder. Discusses safety features; lists prices. Illustrated with photographs.—HODGEN ENGINEERING & MANUFACTURING CO., 7th & Rockford, Tulsa, Okla.

B-12 ARC WELDERS—Bulletin, 2 pages—Illustrates and describes arc welders for sheet metal production and repair. Includes table of power requirements, dimensions, shipping weight, and photographs of models available.—LARKIN LECTRO PRODUCTS CO., Pine Bluff, Ark.

B-13 RAILWAY CAR HANDLING—Bulletin TM-101, 8 pages—"The Whiting Trackmobile" describes method of spotting, switching, and hauling railway cars; protecting and preserving masonry, and for illustrating with applicational photographs. Construction features, table of performance, and dimensions are included.—WHITING CORPORATION, Harvey, Ill.

B-14 PROCESS EQUIPMENT—"Bondact Catalog"—Illustrates and describes process machine, the "Bondactor", for air placement of concrete, refractories, insulating concrete, acoustical plastics, and other cementitious materials in construction and maintenance operations.—AIR PLACEMENT EQUIPMENT COMPANY, 2525 Southwest Boulevard, Kansas City 8, Mo.

B-15 WELDING—Manual, 44 pages—"Manual of Welding Engineering and Design" covers latest developments in welding materials and techniques with special reference to applications for defense production and maintenance. Contains technical data on characteristics and operational procedures.—EUTECTIC WELDING ALLOYS CORPORATION, 40 Worth St., New York 13, N. Y.

B-16 MATERIALS HANDLING—Bulletin 222, 2 pages—Heavy duty hand pallet trucks in capacities of 4000 lb and 6000 lb are described and illustrated with actual "on the job" photographs, showing how the truck is used in confined areas and in conjunction with power operated models.—LYON-RAYMOND CORPORATION, 9078 Madison St., Greene, N. Y.

B-17 SOOT BLOWER INSTALLATIONS—Bulletin 484, 24 pages—"A few outstanding Vulcan Automatic Sequential Soot Blower Installations in General Stations" are described by means of actual photographs with explanatory captions, diagrams, and text.—VULCAN SOOT BLOWER CORPORATION, 1945 Grove Drive, Erie, Pa.

B-18 MASONRY SURFACE MAINTENANCE—Folder, 4 pages—Describes "Longlife," a heavy duty sealant for stonewalls in the operational areas where plaster-bonding over masonry. Properties, method of applying, and recommended uses are included. Illustrated.—FLEXROCK COMPANY, Fibert and Cuthbert, West of 36th, Philadelphia 4, Pa.



LOCKED IN STRENGTH of Tri-Lok open steel flooring gives efficient load distribution, even on long spans. Get maximum strength, light, and air with minimum weight. Available in Rectangular, Diagonal, and Super-Safety U-type Flooring, and Stair Treads of all kinds.

The Tri-Lok Company is also equipped to furnish riveted and Tri-Forge welded open steel flooring. Tri-Lok grating can be furnished in a variety of metals, including aluminum alloy, stainless steel, etc. Write for Bulletin MY1140.

DRAVO CORPORATION

National Distributor for the
Tri-Lok Company

Dravo Bldg., Pittsburgh 22, Pa.

Sales Representatives
in Principal Cities



Nothing conveys an impression of quality and prestige more readily than a perfect business card designed by us.

A letter from you will bring an assortment of the business cards we have made for others.

THE JOHN B. WIGGINS CO.
636 So. Federal Street, Chicago 5

WIGGINS
Peerless Book Form
CARDS



"That Pritchard Tower Is Sure Doin' A Job For Us" — Says Refinery Superintendent.

We got a tough assignment back in '49. Our customer needed a tower which would cool more than 4,000 gallons of recirculating water per minute from 105° down to 85° F., only 5° above the ambient wet bulb temperature. His entire process depended completely on 85° water—there could be no excuses! Could we do it?

We could, and we did. A few months later the Pritchard series "J" Induced Draft Cooling Tower with separate coil shed pictured

above was put into operation.

Today, according to the plant superintendent, this tower is consistently equaling or exceeding the design performance in accordance with the test procedures outlined by the ASME, with the operating crew taking their own test readings.

Why don't you, too, find out about the advantages of using Pritchard Cooling Towers in your plant? Consult your nearby Pritchard representative for full information.



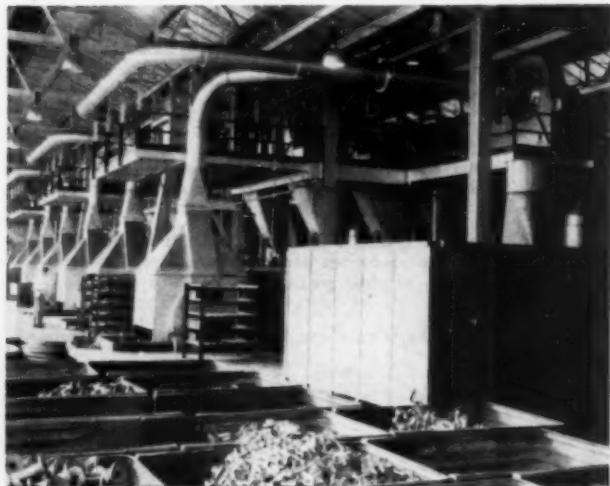
EQUIPMENT DIVISION
J.E. Pritchard & Co.
 Dept. No. 115 908 Grand Ave., Kansas City 6, Mo.

District Offices: HOUSTON • ST. LOUIS • CHICAGO • PITTSBURGH • TULSA • NEW YORK
 Representatives in Principal Cities from Coast to Coast

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 Bulletins

**1st in Industrial Good Housekeeping...
 EFFICIENT DUST CONTROL**

Casting shake-out booths in a leading farm implement manufacturer's plant.



- Well engineered and effective dust control is necessary to maintain cleanliness and efficient operation.

The photo shows a foundry shake-out room in which dust is effectively suppressed and removed at the source by virtue of collection both above and below the shake-out.

There is no simple "formula" for the selection of dust control equipment. For guaranteed results — just one contract, one responsibility for a complete, ready-to-operate system, consult experts. If you need a new system . . . or more capacity in an existing one, call on Liberty Engineering.



**ENGINEERING AND
 MANUFACTURING CO.**

1454 South 18th St.
 Louisville 1, Ky.

A Division of The Kirk & Blum Mfg. Co.

CLASSIFIED ADS

BUSINESS—EMPLOYMENT—EQUIPMENT—PROFESSIONAL CARDS—OPPORTUNITIES

RATES DISPLAYED

"For Sale," Agents Wanted, and all other advertisements using bold face type or otherwise displayed, \$6.00 per column inch per insertion.

Rates for larger spaces furnished on application

WITHOUT DISPLAY

"Position Wanted" advertisements, 5 cents per word per insertion. Minimum charge \$1.00. Payable in advance. (When replies are to be received in our care allow eight words for the box address.)

FOR SALE

4—333 KV-A Westinghouse transformers, single phase, 60 cycle, Type SL, high voltage 2400, low voltage 600. Serial numbers 2411171-72-73 and 3401401.

4—633 KV-A Westinghouse transformers, single phase, 60 cycle, Type SL, high voltage 13860/13530/13200/12870/12540, low voltage 2400. Serial numbers 4392548-49-50 and 4650414.

1—300 KV-A GE auto-transformer, three phase, 60 cycle, Type HT, Form R, voltage 4000Y-2300. Serial Number 5748672.

MUNICIPAL UTILITIES BOARD

P. O. Box 30
Albertville, Alabama

FOR MEN LOOKING FOR A SALES FUTURE

Opportunities open for sales representatives with a large national manufacturer of process plants, water treatment and allied chemical lines for industrial plants. Established territories open. Mechanical or Chemical Engineering degree from accredited college or university required. Under 35 years of age, three years' experience in sales, engineering, production or related fields. Write fully, giving business history and salary requirements. All replies confidential.

WHITE BOX 162

c/o SOUTHERN POWER & INDUSTRY,
806 Peachtree St., N.E., Atlanta 5, Ga.

STEAM PLANT SUPERINTENDENT

Electro power cooperative with power plant under construction needs engineer with construction and steam plant operating experience to be in charge of operating 15,000 KW unit on pulverized coal fuel. In reply furnish full qualifications, qualifications, age, salary expected, education, etc. Write Box 360, Jefferson City, Missouri.

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2—125 KVA Westinghouse AC generators, 110 Volts, 277 RPM. Powered by 2 Bruce MacBeth gas/gasoline engines. For immediate sale from Dallas plant changing products.

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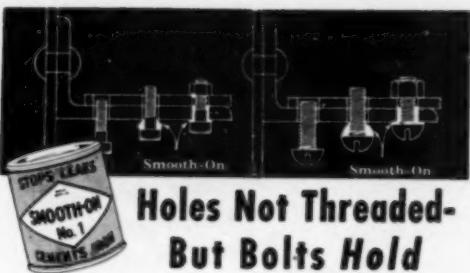
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(Basic Principles of Steam Plant Practice)

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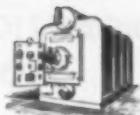


• A 2-drum water tube boiler + automatic oil and gas burner + induced draft fan + operating and safety controls.

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• In 10 standard sizes: 75 thru 800 developed horsepower. Steam working pressure from 100 PSI.



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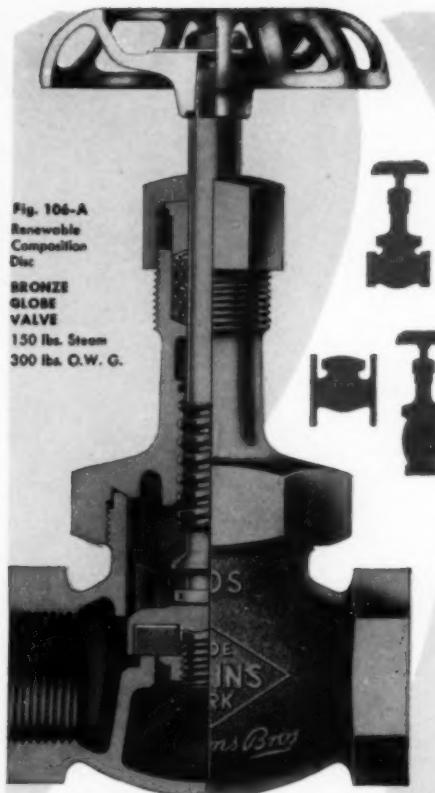
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Valve combinations for 90% of industrial piping
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Fig. 106-A
Renewable
Composition
Disc

BRONZE
GLOBE
VALVE
150 lbs. Steam
300 lbs. O.W.G.

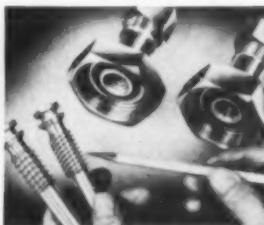


JENKINS FIG. 106-A "FAMILY"

Start with the standard Fig. 106-A. Trimming is interchangeable in Globe or Angle body, screwed or flanged.



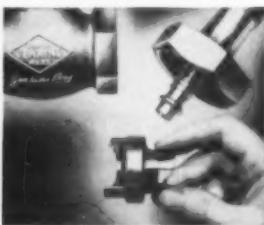
For Close Control — In throttling service, the nut which holds the disc in the disc holder is removed and replaced with Throttling Nut, Fig. 344.



For Quick Opening and Closing — Merely substitute the bonnet and spindle from Fig. 941, in which threads are pitched more sharply.



For Lift Check Service — Globe or Angle Bodies can be fitted with interchangeable Cap, Disc Holder, and Guide Disc Nut from Fig. 117A. Addition of spring from Fig. 635A provides spring loaded service.



For Step & Check Service — Use the 106A trim, but substitute this spindle from Fig. 630A and replace the regular disc nut with the check valve guide disc nut.

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VALVES

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